

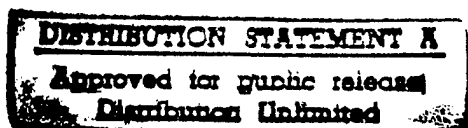


Assessment of Customer Perceptions of the  
Hazardous Materials Pharmacy

Thesis

Sean M. O'Brien, 1<sup>st</sup> Lieutenant, USAF

AFIT/GEE/ENV/97D-19



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Assessment of Customer Perceptions of the  
Hazardous Materials Pharmacy

Thesis

Presented to the Faculty of the School of Engineering  
of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the

Requirements for the Degree of

Master of Science in Engineering and Environmental  
Management

Sean M. O'Brien

1<sup>st</sup> Lieutenant, USAF

December 1997

ASSESSMENT OF CUSTOMER PERCEPTIONS OF THE  
HAZARDOUS MATERIALS PHARMACY

THESIS

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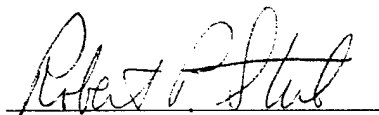
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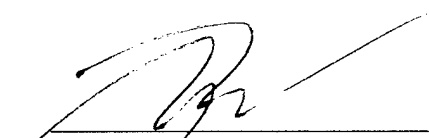
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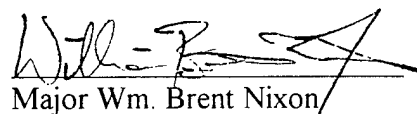
In Partial Fulfillment of the

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Abstract

The purpose of this thesis was to assess customer perceptions of the Hazardous Materials Pharmacy (HMP) in order to provide Air Force leaders with information to increase the performance level of the HMP.

Two focus groups were conducted with HMP customers on the causes of positive and negative perceptions of the pharmacy. During the focus groups brainstorming was used to generate causes of perception, an affinity diagram was constructed to group causes of perception into logical categories, and interrelationship digraphs were constructed to show relationships and influence between categories and between causes of perception in order to identify the most significant factors causing positive and negative perceptions of the HMP.

There was a high degree of consistency between the two focus groups on the causes of positive and negative perceptions of the HMP. The category that “stood out” as having the greatest influence over negative perceptions of the HMP was cited by focus group one as Management Issues and by focus group two as Need For Better Policy. The key factor contributing to negative perception within these categories were *Lack of Top Level Support* and *HMP Policy Problems*. In the case of positive perceptions no specific category or factor “stood out” as contributing significantly more than other areas of positive perception. However, focus group one cited Good HMP Specific Programs and focus group two cited The HMP Helps With Material Usage as the categories having the most influence over positive perception and *Success With New Programs* and *The HMP Helps You Get The Right Quantity* were the key factors within the two categories identified by the focus groups.

Additionally, a separate analysis that compared the observed HMP customers needs with the observed HMP systems characteristics was completed to identify areas for improvement. The areas for improvement were identified as: The information and data management system, personnel issues for HMP customers, base-wide understanding and support of the HMP program, update training for HMP customers, and continuity problems in the HMP.

# Assessment of Customer Perceptions of the Hazardous Materials Pharmacy

## Chapter I.

### Introduction

#### Background:

On January 7, 1993, the Secretary of the Air Force and the Air Force Chief of Staff jointly signed a comprehensive pollution prevention action plan for the U.S Air Force. In the memorandum they stated, "The Air Force is committed to preventing future pollution by reducing use of hazardous materials and releases of pollutants into the environment to as near zero as feasible." (Morehouse 151). One section contained in the action plan identifies specific goals and objectives for the reduction of Hazardous Material (HazMat) usage and Hazardous Waste (HazWaste) disposal for the Air Force. Specifically, the plan called for 25% reduction of HazWaste by 1996 and a 50% reduction by 1999.

Base commanders have responded to this goal by establishing hazardous material control points, called Hazardous Material Pharmacies (HMP). The HMP establishes single point control and accountability over the requisitioning, receipt, distribution, issue and reissue of hazardous materials. The establishment of a HMP may lead to a significant reduction of hazardous material usage and hazardous waste generation.

The reduced use of hazardous materials may partially be due to the elimination of redundant supply channels. Prior to implementing a HMP on a base, HazMat requesters could place orders for materials through six to ten different supply channels (Pro-Act 1994). Requesters would sometimes place the same order for material through multiple supply channels in order to receive the material as soon as possible. This was done because requesters did not know which supply channel would provide the needed

material in the shortest amount of time. However, after receipt of the material through the quickest supply channel, the orders placed for the now unneeded HazMat on the other supply channels would still be received (HMP Commanders How To Guide, 1993). The shelf life of those now surplus materials would often expire before they could be used. These practices led to higher materials costs, and they created additional disposal costs.

Another reason the HMP has been credited with reducing the total amount of HazMat usage is by issuing HazMat to requesters in the smaller quantities. Issuing HazMat in quantities necessary to do the job at hand helps reduce the likelihood that excess HazMat will be left over after a job is completed. It also reduces HazMat storage at the units. Thus, the practice of issuing HazMat materials in the smallest quantities necessary also helps reduce the volume of expired shelf life materials.

After implementation of a HMP at Hill AFB, material acquisition costs were reported to have dropped from \$11 million in 1991 to \$3.6 million in 1992 (Pro-Act 1994). These numbers only reflect the acquisition costs and do not even begin to include the reduced HazWaste disposal costs or liability costs, which can easily be in the millions of dollars when hazardous waste is mismanaged.

In addition, the implementation of a HMP may reduce environmental liability concerns and improve worker safety. One function of the HMP is to recommend substitutes for hazardous materials when a less hazardous product is available that can still perform the job. This practice reduces worker exposure to harmful chemicals and also reduces the possibility of a hazardous waste spill.

**General Issue:**

Environmental concerns, now more than ever, have dramatic impacts on the Air Force and its mission. Failure to take environmental impacts seriously can result in significant mission impacts, heavy fines, and loss of public image. Therefore, when a base decides to switch to a HMP and single point control for hazardous materials, it must do so in a very well-planned manner. Successful ingredients for implementing a pharmacy system often include: wing commander support, a base wide culture change, and customer buy-in of the new system (HMP Commanders How To Guide).

The concept of a HMP is a relatively new one. Bases began implementing HMP programs in the late 1980s. However, most bases have only recently begun implementation of the hazardous material pharmacy program. As a result of the pharmacy concept's infancy, a clear-cut approach to establishing a HMP on a base has not been available until recently. It was not until May 1995, that the Air Force issued an implementation guide for the HMP. In August 1997, the Air Force issued Air Force Instruction (AFI) 32-7086, Hazardous Materials Management, concerning the HMP program. The lack of centralized control over the HMP when it first began forced installations to find ways to implement HMP programs and policies without direct guidance. As a result, manpower, funding, and ownership of the HMP have been problems within the wing structure.

By creating AFI-32-7086, Hazardous Materials Management, Air Force leadership has recognized the importance of running an effective pharmacy and the potential benefits the HMP offers. The AFI deals in depth with the formation of Hazardous Material

Management Program Teams (HMMPT) whose primary responsibility is oversight and support of the pharmacy (AFI 32-7086 sec 1.1).

**Problem Statement:**

Although it is generally accepted among Air Force leaders and environmental managers that implementing a hazardous material pharmacy has many potential benefits, there has been little substantive research on the pharmacies (Pro-Act 1994). Of the research that has already been conducted, most has been of a quantitative nature. The main objectives of past research have been to quantify the effect that implementing a pharmacy has on reducing HazMat ordered, reducing HazWaste, and time to requisition materials (Iseman 1996, Nelson 1994). However, most of the attempts to quantify the actual efficiencies of the HMP's have been inconclusive. The inconclusive aspects of past research has been mostly due to incomplete record keeping prior to HMP implementation and changes in the base mission that affected quantities of HazMat ordered, but which are not a direct result of implementing a pharmacy on a base. Examples of some things currently affecting HazMat usage on a base, but not associated with the pharmacy include: drawdowns, squadrons and/or missions leaving a base, and process improvements or pollution prevention initiatives such as material substitution at the industrial work areas.

**Research Objective:**

Since previous attempts to quantify pharmacy effectiveness have, in most cases proved to be inconclusive, this research will take a more qualitative approach to address the



affect of pharmacy policies and programs. The HMP is an organization that operates under the same principles as other organizations on base. Since the early 1900s, substantive research has been conducted on the study of organizations, and the factors that contribute to successful organizations. One of these factors that has become a significant issue today is that of customer satisfaction.

Many organizations in the private sector have realized that their ultimate success or failure may rely upon the satisfaction level of their customers. These companies devote resources toward determining levels of customer satisfaction or dissatisfaction. Once companies determine which aspects of their program are causing dissatisfaction, they take measures to eliminate them. Some of the methods that companies have used to reduce customer dissatisfaction are policy changes, improved worker training, and improvements in customer service (Kolarik 849, 850).

This research focuses on factors contributing to positive and negative perceptions of the hazardous materials pharmacy among its customers. Once factors leading to positive and negative perceptions are known, management can take action to either enhance or minimize the respective perceptions. By shaping positive customer perceptions, Air Force leadership can have more assurance that the HMP has been implemented with a framework for operations that is advantageous for success of the pharmacy program. As the Air Force HMP Implementation Guide (31 May 1995) states, "Failure in customer service will ultimately mean a return to multiple tracking systems." Therefore, the research questions that this study will be designed to answer are:

1. What causes positive and negative perception, among HMP customers, of the HMP?

2. Do interactions or dependencies exist among causes of perceptions?
3. If interactions exist, which cause of perception dominates the particular interaction?
4. What is the most significant cause of positive and negative perception?

The answers to these research questions should provide Air Force decision makers with valuable information pertinent to improving the hazardous material pharmacy program.

## **Chapter II**

### **Literature Review**

#### **Overview**

The purpose of this chapter is to provide background on the history of the Hazardous Material Pharmacy (HMP) program's implementation by the Air Force, and to present the current environment of the HMP. There have been numerous factors that have arisen since the strong environmental movement of the 1960s that have made the HMP and similar programs like it in the private business sector a sound strategy to follow. This chapter describes the federal legislation that has evoked creation of the Air Force's environmental management plan, of which the HMP plays a part. Also, in order to better understand the current environment of the HMP, this chapter describes the Air Force Policies and Directives that govern the operation of the pharmacy. The last section of this chapter addresses focus groups and their applicability to this research effort.

#### **Legislative Background:**

##### **National Environmental Policy Act**

"The National Environmental Policy Act of 1969 (NEPA) has been heralded as the Magna Carta of the country's environmental movement" (Spensley et al. 308). NEPA, which was enacted in 1970, has three primary elements:

- 1 a declaration of national environmental policies and goals;
- 2 the creation of action forcing provisions for federal agencies to implement these policies and goals; and
- 3 establishment of the Council on Environmental Quality (CEQ) (Spensley et al. 308).

The principle purpose of this legislation is to ensure that environmental concerns are considered along with other more traditional factors (time, money, labor, etc.) before embarking on large federal projects and/or programs. This legislation has forced federal decision makers to consider environmental impacts such as: the destruction of wetlands, effects on endangered species, and air and water quality before construction of large projects or beginning new programs. Failures on the part of decision makers to understand and/or comply with the provisions of NEPA has resulted in many federal projects being delayed, halted, or even canceled. Therefore:

NEPA, first of all, makes environmental protection a part of the mandate of every federal agency and department...It [the agency] is not only permitted, but compelled, to take environmental values into account. Perhaps the greatest importance of NEPA is to require...agencies to consider environmental issues just as they consider other matters within their mandates. (Spensley et. al. 311)

The directives contained in NEPA have played a significant role in defining the framework from which other environmental legislation pertinent to the pharmacy has been enacted (Spensley et al. 308-314).

### **Resource Conservation and Recovery Act**

The Resource Conservation and Recovery Act (RCRA), passed in 1976, created the primary body of legislation dealing with solid wastes and hazardous wastes. It was enacted in order to create accountability for hazardous wastes and the management of those wastes. It created the cradle-to-grave philosophy for management of hazardous wastes that is mandated today. Hazardous waste generators, transporters, and treatment facilities must all comply with the standards set forth in RCRA. RCRA requires that hazardous waste be tracked from the point of its inception to the point when it is ultimately disposed or treated (Case 44).

The above mentioned mandatory tracking of hazardous wastes is one of the primary reasons that the HMP was formed. Previously, all base Air Force units were responsible for tracking and maintaining records of the hazardous wastes they generated. This meant that an individual or individuals within each unit had to spend numerous man-hours ensuring that the tracking requirements were being complied with. The creation of the pharmacy on a base eliminates some of the redundancy inherent in the previous program by allowing a single office to be responsible for all of the hazardous material tracking on the base.

### **Hazardous and Solid Waste Amendments of 1984**

RCRA was substantially amended in 1984 by the Hazardous and Solid Waste Amendments of 1984 (HSWA), which:

mandated far-reaching changes to the RCRA such as waste minimization... Subtitle A of RCRA declares that, as a matter of national policy, the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible... In addition, all waste that is generated must be handled so as to minimize the present and future threat to human health and the environment (Case 44).

The 1984 amendments to RCRA forced decision makers to begin thinking about the processes responsible for the generation of hazardous wastes. This was a dramatic change of thinking from "end of pipe" treatment strategies to the realization that changes in the system could eliminate or minimize hazardous waste and reduce costs and liabilities associated with them (Case 47).

As will be discussed in greater detail in the next section of this chapter, one of the benefits of the HMP is the reduction in the total amount of hazardous material used on an Air Force base. This directly relates to fulfilling one of the primary goals in HSWA, the

minimization of hazardous waste, and was a primary factor in the development of the HMP program.

### **Pollution Prevention Act**

The Federal Pollution Prevention Act of 1990 (PPA) establishes pollution prevention as a national goal. This act required the Environmental Protection Agency (EPA) to develop and implement a strategy to promote source reduction. Source reduction is defined under section 42 U.S.C.A 13101(b) as:

Any practice which reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream, or otherwise released into the environment prior to recycling, treatment or disposal, and reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants.

The PPA also defined pollution prevention to mean:

source reduction and other practices that reduce or eliminate the creation of pollutants through increased efficiency in the use of raw materials, energy, water or other resources or protection of natural resources by conservation.

In addition to defining the above two key terms, the PPA required the EPA to identify measurable goals and consider the affects of programs on source reduction and to evaluate any existing barriers to source reduction. This strategy published by the EPA in 1991, (56 Fed Reg. 7849, 26 February 1991) although not mandatory, established the goal to reduce releases of specific chemicals by at least 50% by 1995 (Scanelli et al. 453).

Thus, the PPA played a critical role in helping Air Force leaders develop their own set of pollution prevention goals. These goals are listed in the Air Force policy section of this chapter.

The PPA also amended the Emergency Planning and Community Right-to-Know Act (EPCRA) by creation of the Toxic chemical Release Inventory (TRI) (Scagnelli et al 452). Under this act, companies and government agencies are required to compile an annual report of their toxic releases into the environment. The TRI is public information, and it has created a great impetus for companies to reduce the amount of toxic chemicals released into the environment each year. Another aspect of the TRI requires organizations to report their pollution prevention and recycling efforts as well (Scagnelli et al. 452).

The creation of such lists as required by the PPA poses a difficult task for Air Force agencies because of the multitude of different HazMat users and procurement systems on each base. By ensuring a single point of control for HazMat, the HMP greatly contributes towards compliance with the mandates of the TRI. The HMP is able to accomplish this task through several environmental computer databases. Currently, two such computer systems exist to facilitate this effort, the Environmental Management Information System (EMIS) and the Defense Hazardous Material Management System (DHMMS). In an effort to switch to one environmental computer system, the Air Force has established the Hazardous Substance Material System (HSMS) as the most preferred option for environmental management (Iseman 14).

### **Federal Facility Compliance Act**

Until 1992, federal facilities were able to operate under sovereign immunity from certain aspects of RCRA. RCRA is legislation governing hazardous and solid waste practices. The Federal Facility Compliance Act (FFCA) expressly waived the sovereign immunity of federal facilities with regard to the imposition of administrative and civil

finances and penalties. Under FFCA, federal facilities could now be fined for failure to comply with the solid and hazardous waste procedures outlined in RCRA (Anderson 333). This increased liability for environmental matters has caused a heightened awareness among Air Force leaders of the implications of not properly addressing environmental problems.

This Act also enlarged the regulatory framework of RCRA to include the "management" of solid and hazardous wastes. By including "management" in the legislation congress made the liability for managers of solid and hazardous waste equal to that of disposers (Anderson 333). This legislation thereby helped push Air Force agencies in adopting an environmental strategy and plan. As Craig Anderson points out in his review of FFCA, "There can be no doubt, however, that the mere possibility of even minor penalties has gotten the attention of senior leaders throughout the military departments and other federal government agencies" (Anderson 351). The pharmacy program is one aspect of the Air Force's plan to address environmental issues.

In addition to the status of sovereign immunity from RCRA that federal facilities previously enjoyed, federal facilities were also not required to follow the guidance in the PPA. However, passage of Executive Order 12856 in 1993 held the Department of Defense accountable for the TRI reporting procedures of the PPA. The passage of FFCA and Executive Order 12856 marked a pivotal point for the Air Force in environmental matters and played a major role in making the HMP program the preferred strategy for HazMat management Air Force wide.



## **Air Force Environmental Policy and Pharmacy Guidance**

In response to federal legislation and growing environmental pressures, the Air Force began developing a strategy to meet the requirements of the above mentioned legislation and to fulfill its' role of environmental stewardship. On 10 October 1989, Secretary of Defense Dick Cheney issued a memorandum on environmental policy stating:

The administration wants the United States to be the world leader in addressing environmental problems, and I want the Department of Defense to be the federal leader in agency environmental compliance and protection.

DOD Directive 4210.15, Hazardous Materials Pollution Prevention (27 July 1989), was one of the first directives to support pollution prevention. It states, "the Military Services are to select, use, and manage hazardous materials so as to incur the lowest possible life-cycle costs to protect human health." Subsequently, the Air Force Chief of Staff, General Merrill A. McPeak, and the Secretary of the Air Force, Donald B. Rice, signed a joint memorandum formally establishing the Air Force Pollution Prevention Program. The memorandum stated, "the Air Force is committed to preventing future pollution by reducing use of hazardous materials and releases of pollutants into the environment to as near zero as feasible." (Morehouse 151)

As a result of the AF pollution prevention program memorandum, AFPD 32-70, "Environmental Quality", was published 20 July 1994 along with AFI 32-7080, "Pollution Prevention Program," 12 May 1994. The pollution prevention program specifically addressed the control of hazardous material, and provided the first provisions for the hazardous material pharmacy concept. AFI 32-7080 states that:

Installations will develop procedures to centrally control the purchase and use of hazardous materials. This concept minimizes hazardous material and ozone depleting chemicals use through:

1. Centralized control of hazardous substances purchased.
2. Centralized issuing and distribution of hazardous substances.
3. Purchase of hazardous substances in smallest unit of issue required for customer service.

Although this AFI stated what the mission of an operation such as the pharmacy was to be, it did nothing to prescribe how creation of HMP should be implemented, nor did it create manning for such an organization, or establish funds for the pharmacy. It also left much of the authority for implementing a HMP up to individual base commanders. It is possible that many of the problems that the HMP is now facing, such as commands using different environmental computer systems, are a direct result of the decentralized method with which the HMP was implemented on Air Force installations.

It was not until 31 May 1995 that a memorandum was issued on the "Hazardous Material Pharmacy Implementation Plan." Although not an AFI, this memorandum established the HMP as part of the Air Force's Objective Wing structure. The 31 May 1995 memorandum established a common set of tasks that the HMP will be responsible for performing at every Air Force installation. It also established manning to temporarily include personnel from SG, CE, and SE. The Implementation plan lists the goals of the pharmacy as follows:

1. The HMP will be the single point of accountability and control of HazMat and Ozone Depleting Substances (ODS).
2. The HMP must provide the highest level of customer support. Failure in customer service will ultimately mean a return to multiple tracking systems.

The implementation guide also states that the HMP, "will also generate cost savings through reductions in HazMat usage, eliminates existing duplication of HazMat tracking,

and provide for the effective control of limited Ozone Depleting Substances (ODS)" (HMP Implementation Plan, May 1995).

The Air Force has just recently (Aug 97) published an AFI "Hazardous Materials Management" AFI 32-7086 to manage the procurement and use of HazMat. AFI 32-7086, which was officially released in Aug 1997, articulates the purpose, objectives, organization, and responsibilities of the HMP. This AFI also establishes Hazardous Materials Management Process (HMMP) teams at the AF, MAJCOM, and Installation levels. The HMMP team is a cross-functional group that reports to the Environmental Protection Committee (EPC) and provides oversight on the HMP, among other duties. As defined in AFI-32-7086, the purposes of the HMP are:

1. The purpose of the HMP is to provide Air Force installations with a standard way to manage HazMat procurement and use and comply with ESOH requirements.  
Note: Although the primary focus is on the ESOH, the broader objective is to protect the environment, safety and health of workers and communities.
2. The HMP provides for process-based authorizing, procuring, issuing, tracking, and disposing of HazMat.
3. The HMP ensures that HazMat users obtain the material required to perform their AF missions.
4. The HMP ensures the purchase of HazMat in the smallest quantities necessary to accomplish the mission.

AFI 32-7086, "Hazardous Materials Management" and the "Hazardous Materials Pharmacy Implementation Guide" are currently the main sources of guidance to HazMat managers and base commanders on implementing HMP policies and programs.

However, many Air Force bases (Kelly, Hill, Ogden, Wright-Patterson, etc.) have gone a step further and have created individual HMP Management Plans for their respective

bases. The development of these plans is usually accomplished with the use of contracts, which run about \$25,000-\$100,000 per base (Banford, June 97). Thus, since its inception, the HMP has had time to develop some "best management practices" and to cross-feed these findings to one another through mechanisms such as the Air Force Center for Environmental Excellence (AFCEE) (Pro-Act) . However, there still exist problem areas within the HMP policies, programs, and standards that are a result of the decentralized approach with which the HMP program has been developed in the Air Force.

### **Focus Groups**

The purpose of this section in the literature review is to show how and why focus groups have been used in past research and their applicability for use in the current study. The use of a focus group format was chosen over survey or interview techniques for a number of reasons. This section will review some of the strengths and weaknesses of three forms of data gathering techniques: surveys, interviews, and focus groups.

Central to the issue of which data gathering technique to use was the research question itself. The final method chosen would have to be able to best answer the question: "what factors contribute to positive and negative perceptions of the HMP, and what, if any, are the relationships that exist between them?" The nature of this question is very qualitative and subjective. Qualitative research has several distinct characteristics. Dr. John Creswell lists these characteristics in his book Research Design: Qualitative and Quantitative Approaches as:

1. Qualitative Researchers are concerned primarily with **process** rather than outcomes or products

2. Qualitative researchers are interested in **meaning** - how people make sense of their lives, experiences, and their structures of the world.
3. The qualitative researcher is the **primary instrument** for data collection and analysis. Data are mediated through this human instrument, rather than through inventories, questionnaires, or machines.
4. Qualitative research involves **fieldwork**. The researcher physically goes to the people, setting, or site.
5. Qualitative research is **descriptive** in that the researcher is interested in process, meaning, and understanding gained through words or pictures.
6. The process of qualitative research is **inductive** in that the researcher builds abstractions, concepts, hypotheses, and theories from details (Creswell 145).

Because the purpose of the question of this research effort is to draw out human perceptions, a qualitative method was chosen. Focus groups provide researchers with a method for conducting research that is qualitative in nature.

The history of focus groups began in the 1930s. Social scientists began discovering benefits of using non-directive individual interviewing. Previously, researchers were mainly using questionnaires that limited the respondents choices, and led to limitations in the insights obtained from the research (Krueger 18). "The open-ended approaches allow the subject ample opportunity to comment, to explain, and to share experiences and attitudes as opposed to the structured and directive interview that is dominated by the interviewer." (Krueger 18-19).

During World War II, increased emphasis was placed on focused interviewing in groups, primarily with the purpose of increasing soldier morale. Since that time, the majority of the applications of focus group interviewing have been in market research

(Patton 335). Focus groups have proven to be very valuable to companies wishing to test the success potential of their products, prior to mass production. However, recently focus groups have been used in an increasing variety of applications:

Focus groups can be conducted with client groups during a program to identify strengths, weaknesses, and needed improvements. Focus Groups can be used ... to gather perceptions about outcomes and impacts (Patton 336).

For example, focus groups have been used to understand an organization's image, assess current programs, determine a needs assessment, etc. (Krueger 31-37). One application of focus group interviewing was conducted at the University of North Carolina in order to provide feedback to school administrators on a current curriculum program. "They held focus groups to uncover the nature and extent of problems encountered by students" (Diamond and Gagnon 54). In another example, focus groups were used to determine the "core values" of baby boomers (Mazzella H8). Other research states that, "questions that are particularly amenable to the focus group method are: "How might people resist organizational change? [and] How can service be improved?" (Byers et al. 63). "Focus groups...have gained recognition as a respected technique for learning how people feel" (Hunsaker 53). Focus groups have even been used by a June 1997 Environmental Auditing Roundtable (EAR) to discuss aspects of environmental management systems (EAR focus group... 8). As can be seen in the focus group literature and from the above examples, focus groups have been used to uncover answers to the types of questions such as those being posed by this research.

According to Michael Patton, author of Qualitative Evaluation and Research Methods, focus groups are usually made up of six to eight individuals. The primary reasoning behind these numbers is that interaction among group members and diversity is

desired. However, when groups get larger than 10 or 12 individuals, the group tends to fragment and/or not everyone gets a chance to share their insights (Krueger 27). Focus groups have several features and characteristics:

A focus group can be defined as a carefully planned discussion designed to obtain perceptions on a defined area of interest. The discussion is relaxed, comfortable, and often enjoyable...Group members influence each other by responding to ideas and comments in the discussion (Krueger 18).

The characteristics of focus groups include, “(a) people, who (b) possess certain characteristics, (c) provide data (d) of a qualitative nature, (e) in a focused discussion.” (Krueger 27).

According to Krueger, “focus groups are valid if they are used carefully for a problem that is suitable for focus groups” (Krueger 41). The above discussion on what is a focus group and how it can be used, along with the description of the basic question of this research, shows that focus groups provide a viable method to discover the positive and negative perceptions of the HMP by its customers.

Table 2.1 lists some of the possible advantages and disadvantages of the three methods of data gathering mentioned earlier: surveys, individual interviews, and focus groups (Morgan 15-24).

**Table 2.1 Data Gathering Techniques, Strengths and Weaknesses**

<b>SURVEYS</b>	<b>INTERVIEWS</b>	<b>FOCUS GROUPS</b>
+ Can reach many people	+ allows for in-depth probing of responses	+ allows for in-depth probing of responses
+ Doesn't take too much time	+ Researcher gets feedback	+ Researcher gets feedback
- Assumes researcher knows what questions to ask	- Can't reach many people	+ Allows group to come to consensus
- Doesn't allow for in-depth probing of an issue	- Doesn't allow for inter-action among respondents	+ Doesn't take too much time
- Researcher gets no feedback	- Hard to manage data (multiple sources)	+ Allows for group synergy
- Doesn't allow for inter-action among respondents	- Data analysis is another step	+ Data analysis can be done easily
- Hard to manage data (multiple sources)	- Very time consuming	+ Easy to manage data (one source)
- Data analysis is another step		- Can't reach many people

A weakness of survey techniques (for this research question) is that participants responses would be limited to only the questions asked in the survey, and no in-depth analysis of the factors causing positive or negative perception could be made. The use of surveys would also force the researcher to list some factors of positive and negative perceptions, possibly biasing respondents' answers by assuming that a relationship actually exists between positive and negative perceptions and the factors listed in the survey. The reverse of the above example is also true. Because the researcher can in no way include all of the causes of customer perceptions, he biases the study by assuming that there is no link between those items left out of the survey. Additionally, each participant's responses would be different and possibly contradictory, making data management cumbersome. Furthermore, surveys do not allow for any group interaction which can lead to better problem identification.

A weakness of the personal interview technique is that it takes a great deal of time, resulting in a limited number of people being included in the study. Additionally, it also



does not allow for any interaction among participants, and data management and analysis can be cumbersome due to the multiple sources of information that must be merged together.

The main weakness of the focus group is that it does not reach as many people as a survey would. The advantage of focus group methods (for this research question) are that they include all the advantages of the other two data gathering techniques (except the “reach” of survey), and they also have some data management and analysis benefits unique to themselves (Patton 335). Furthermore, it has been determined that progressive organizations are using focus groups to obtain customer perceptions (McCloskey et al. 139). The focus group format allows the facilitator to ask follow-up questions and to request greater detail or examples, none of which is easily accomplished with mailed surveys” (McCloskey et al. 142). For these reasons, focus groups were chosen to elicit and analyze the causes of positive and negative perceptions among HMP customers.

### **Organizational Effectiveness**

In his 1996 text Management, Griffin defines effectiveness as, “Making the right decisions and successfully implementing them” (Griffin 6). He also explains that due to the interactions between an organization and its environment, it follows that effectiveness is related to how well an organization comprehends, reacts to, and influences its environment. However, due to the varied nature and objectives of organizations, a consensus on a universal definition of organizational effectiveness has yet to be reached (Griffin 89). Subsequently, in an attempt to describe organizational effectiveness several models have been built: the systems resource approach; the internal processes approach;

the goal approach; and the strategic constituencies approach (Griffin 89-90). Although, each of these models can be viewed independently from one another to describe organizational effectiveness, the most complete picture can be obtained from an integrated perspective. Thus organizational effectiveness would then be viewed as:

Acquiring the resources needed from the environment and combining them in an efficient and productive manner which facilitates the attainment of organizational goals and satisfies the strategic constituents in the environment making it easier to acquire future resources (Griffin 91).

Breakdowns can occur anywhere in the above system of events. These breakdowns cause an organization's effectiveness to be lowered. Subsequently, when barriers that hinder the above system are removed, the organization can improve its effectiveness (Griffin 89-90).

Three of the approaches to organizational effectiveness included in the combined model directly apply to this research: the internal processes approach, the goal approach, and the strategic constituencies approach. The internal processes approach and strategic constituencies approach both apply to this research because, satisfying customers or employees is critical in each approach. The goal approach is applicable to this research because one of the two goals contained in the HMP implementation guide is to ensure that the HMP provides the highest level of customer support to prevent reverting back to multiple tracking systems for HazMat.

The factors causing negative perceptions of the HMP, among the pharmacies' customers, are possibly barriers in the organizational system that inhibit the overall organizational effectiveness of the HMP. In the same way, the factors causing positive

perceptions of the HMP from its customers may possibly be adding to the overall organizational effectiveness of the HMP.

## **Summary**

In the late 1960s heightened awareness of the risks of improper environmental management by society influenced an extensive array of environmental legislation to be adopted. This legislation has forced businesses and federal agencies to adopt sound environmental management practices. In response to this legislation and society's concerns, the Air Force has adopted an environmental strategy and management plan.

The hazardous materials pharmacy concept began in the late 1980s and is one part of the Air Force's environmental and pollution prevention plans. The HMP is a relatively young organization that has undergone many dramatic changes since Air Force Material Command (AFMC) implemented the first pharmacy. The HMP represents many different possibilities for the Air Force. Among these possibilities are: elimination of multiple HazMat tracking systems; minimization of HazMat used on the base; cost savings through reduced disposal and liabilities; protection of the environment; and improved worker safety through environmental hazard education and personnel exposure record keeping. Due to the tremendous potential benefits, the Air Force has recently established the HMP program as the preferred option for HazMat management. However, due to its infancy, and until recently, the lack of implementation guidance, there exist areas where operations of the HMP and its programs can possibly be improved.

In order to determine the areas for possible improvement of the HMP, users of the pharmacy were asked to state what causes them to have positive or negative perceptions

of the HMP. A focus group format, with HMP customers, was chosen as the method to elicit the positive and negative perceptions of the HMP. The focus group format was chosen because it provided the best method to obtain in-depth data and analysis from HMP customers. UECs and IPMs were chosen to be included in the study because "customer needs are best spoken by the customer" (McCloskey et al. 139).

There are several models that attempt to describe organizational effectiveness. The best description of organizational effectiveness is possibly a combination of these models (Griffin 90). Employees and customers play critical roles in the organizational system described by the combined approach model of organizational effectiveness.

The factors that lead to negative perceptions of the HMP among its customers may be barriers that impede the effectiveness of the HMP and its programs. Furthermore, the factors causing positive perceptions of the HMP among its customers may contribute towards the effectiveness of the HMP. Therefore, decision makers wishing to improve the effectiveness of the HMP should remove barriers in the processes that contribute to negative perceptions and support the programs and policies that are creating positive perceptions of the HMP.

## **Chapter III**

### **Methodology**

#### **Overview**

The purpose of this research is to determine the positive and negative perceptions held by users of the Hazardous Materials Pharmacy (HMP) in order to increase the HMP's effectiveness. This chapter outlines the methods used to ascertain the causes of perceptions of the HMP and why such methods were chosen to be used in this study. The chapter is divided into three sections. The first section describes the general research methodology. The second section of this chapter describes the strategy used to collect the perceptions of HMP customers. The third and last section of this chapter describes the actual methods and tools that were used to elicit and analyze the perceptions of the HMP users.

#### **General Method**

Because previous attempts to estimate the HMP's effectiveness at reducing HazMat usage have proved inconclusive, other approaches to determine the HMP's effectiveness were considered. The originally proposed method to determine the effectiveness of the HMP was to conduct an audit of the HMP's internal structure and processes. The result of such an investigation would be an understanding of the processes and the structure that a particular HMP uses to conduct its business. The researcher would then be able to compare the findings on the HMP to the processes and structure of similar organizations. The major differences between the two would represent possible areas of improvement for the HMP. However, such an investigation would be very time consuming and could

only be accomplished at one or two HMPs. The findings of such an investigation would be very speculative and would not provide decision makers with any specific details about the areas of the HMP that were possibly not working efficiently. Therefore it was essential to find another method to analyze the HMP's effectiveness.

After studying past research on HMPs, the idea of conducting an external audit of the HMPs began to take focus. It was noted that many businesses spend a great deal of time and energy determining how customers feel about their products or services. Businesses conduct this research in hope of discovering any problem areas that exist within the product line or within the organization, so that they can be corrected with the result being a more effective organization (Griffin 76).

Once it was determined that a customer based approach could be helpful in analyzing the effectiveness of the HMP, the method used in this research began to unfold. The objective of this investigation became the determination of the factors causing positive and negative perceptions of the HMP by its customers. The method used in this research, after the objective had been established, consists of a three-step process. These three steps were as follows:

1. Generate customer perceptions.
2. Group ideas into meaningful information.
3. Decide which areas were most critical to achieving the objective so that decisions could be made towards increased effectiveness of the HMP.

Once it was determined that completion of the above three steps would provide useful information to HMP decision makers, a framework geared towards accomplishing each of the three tasks needed to be put in place. Within the philosophy of Total Quality Management (TQM) several quality tools exist to help managers with the type of problem

as posed in this study. Tools have been developed to improve organizational processes at the factory floor and in the front office (Kolarik 139, 173). Many of the quality tools are designed to help managers work with ideas, numbers, or teams (Brassard vi-vii). The quality tools applicable to determining the perceptions of HMP customers are those that help managers work with ideas.

Two TQM references exist to help managers know when to use certain quality tools. The Memory Jogger and The Memory Jogger II, edited by Michael Brassard, charts the quality tools that help managers work with ideas and breaks them into three categories: generating/grouping, deciding, and implementing. One of these charts is reproduced below, showing the TQM tools that would possibly be applicable to this study (Brassard vi).

**Table 3.1 TQM Tools**

<b>Generating</b>	<b>Grouping</b>	<b>Deciding</b>
Brainstorming	Affinity Diagram	Interrelationship Digraph
Force Field Analysis	Cause and Effect Diagram	Nominal Group Technique
Tree Diagram		Radar Chart

The three quality tools used in this research were brainstorming, affinity diagrams, and interrelationship digraphs. A description of each of these three quality tools and how they were applied to this research can be found in the Data Collection Tools section of this chapter. Also, included with the description of the three quality tools used in this research is a brief summary of why the quality tool was chosen over the other quality tools.

## **Data Collection Strategy**

This section addresses the strategy that was used to collect data and provides reasoning why each particular strategy was utilized. This section also addresses the scope of the research, the method used to determine HMP customer perceptions, the selection process for obtaining perceptions, and the validity of the research.

The scope of this research was limited to Wright-Patterson Air Force Base. The inclusion of customers from only one base is a known limitation of this research effort because, the implementation of the HMP and the procedures that each HMP uses has been, for the most part, left up to the individual bases and their respective commanders. This kind of implementation could cause many different HMP policies and programs to exist from base to base, resulting in different perceptions of the HMP among differing bases. Therefore, enough detail is provided on how this research was conducted that HMP managers can reproduce the research at their individual bases if they feel that their programs differ dramatically from the one that was analyzed.

## **Focus Group Format**

It was decided that holding a focus group of HMP users would be the best way to determine positive and negative perceptions of the HMP. The members of the focus groups were chosen carefully in order to obtain diversity of perspectives. This was accomplished by selecting unit environmental coordinators (UECs) and issue point managers (IPMs) from different organizations and types of organizations on the base. Selection of respondents from only one organization or type of organization would limit the scope of data that would be obtained during the focus group. UECs and IPMs are



assigned by base units to manage HazMat for their particular units. The demographic characteristics of the two focus groups were as follows:

Focus Group #1: 3 UECs and 3 IPMs were present, with the following organizations being represented: Civil Engineering, Air Force Institute of Technology, Maintenance, Log Group, Supply, and USAF museum.

Focus Group #2: 3 UECs and 3 IPMs were present; with the following organizations being represented: Maintenance, Logistics Group, Supply, Armstrong Lab, and the Medical Group.

Six people were chosen to participate in the focus group, because this number satisfied the size criteria established by both the focus group and the TQM literature. Focus groups are usually made up of six to eight individuals (Patton 336), and the ideal team size to complete an interrelationship digraph is four to six people (Brassard 77).

The focus groups were held in the HMP conference room. This site was chosen because all of the respondents knew its location, it was also centrally located for all of the respondents, and it was available. Additionally, the HMP conference room had all of the equipment needed to facilitate the meeting: an overhead projector for the initial briefing, a large grease board for the brainstorming session and affinity diagram, and a flip chart and stand to record the interrelationship digraphs. Additionally, the HMP conference room is located in an area without noise or other distractions and is equipped with a door that was closed to prevent respondents comments being overheard. The use of a quiet area that is away from high traffic is advocated by Schwarz for conducting focus groups (Schwarz 1991).

Holding the focus groups at the HMP created the possibility that respondents would be fearful of expressing their true feelings regarding the HMP. However, the number of negative perceptions versus positive perceptions from brainstorm sessions and the apparent ease at which the respondents were able to give them indicate that the respondents were probably not inhibited by the location of the meeting.

The focus groups were both held from 1330 hours to 1600 hours. The meeting began with the researcher explaining the research and the current purpose of the focus group. During the initial briefing the researcher stated that he was not part of the HMP chain of command and that none of the responses would be linked to any particular individual. A substantial amount of research has been conducted concerning whether moderators from within or outside of an organization should be used to facilitate focus groups. The overwhelming majority of these studies state that to obtain the best results an individual from outside the organization should facilitate the focus group (Greenbaum 1991, Rowan 1991, Katcher 1997).

After the initial briefing, the negative perceptions were considered first by conducting a brainstorm session followed by an affinity diagram and ID construction. The factors of positive perception were then generated, grouped, and analyzed in the same manner. The brainstorm sessions lasted approximately 25 minutes. During the brainstorm session discussions were conducted if clarification was needed on a factor of perception. The affinity diagram construction (grouping the notes on the board into categories until consensus) lasted approximately 10 minutes. The interrelationship digraph (showing relationships between factors) construction took approximately 40 minutes. These times were slightly reduced during the positive perception process because the group was

familiar with the techniques and their responsibilities. The group took a ten minute break after completing the negative perception process.

During the focus group discussion the researcher acted as the facilitator. His duties included asking for positive and negative perceptions, writing them down, asking the respondents to group related items together, and asking the respondents whether factors were related and if so which factor had the greater influence between the two. During the focus group the researcher tried to remain objective and not influence any comments or elicit other comments. This objectivity was established by writing down all of the factors of perception that were generated, versus commenting on an idea's value and whether or not it should be included as a recorded item. Additionally, the facilitator conducted each quality tool (brainstorming, affinity, and ID) until the focus group reached consensus on the issue before moving to the next item.

Due to inherent variances involved in the research methodology, it is possible that the views elicited from a select group of HMP users might in fact not accurately reflect the views of the majority of HMP users. Therefore, in order to measure the universality of the results two focus groups were incorporated into the research design. If during a second focus group the respondents generate the majority of the same factors that cause perception of the HMP as the first focus group, it is likely that the major identifiable factors of perception have been generated. On the other hand, if the second group generate a whole new set of factors attributing to perception of the HMP then it is possible that either one of the groups was biased, not all key factors have been identified, or that there exists a wide variation of perception of the HMP amongst its customers.

## Data Collection Tools

**Brainstorming** Brainstorming is a problem solving technique that is used to help identify the nature of the problem under investigation (Brassard [2] pg. 3). Brainstorming is a quality tool designed to help managers generate ideas. Brainstorming is a process that utilizes creative thinking in a group environment to come up with ideas, alternatives, solutions, etc. that might otherwise be overlooked. In order for creative thinking to occur in a group, several prerequisites must be met.

1. **Knowledge** must be gained by passive experience or by active experience. The larger the knowledge base the greater is the "raw material" for new ideas.
2. **Imagination** requires knowledge to be productive.
3. **Evaluation** is the ability to develop embryonic ideas into useable ideas. "creativity is more likely to occur when one lets the imagination soar and then engineers it back to earth" (Shannon 144-145).

Every member of the two focus groups that was selected to participate was either a unit environmental coordinator or an issue point manager. Therefore, all the members had an adequate level of knowledge to evaluate the HMP process and could use their imagination to provide useful information.

Once a group has been selected and the conditions for creative thinking have been satisfied, a brainstorming session can be conducted. Brainstorming is most effective when:

1. everyone in the group agrees on the problem to be addressed,
2. all members in the group participate,
3. all group members agree that every suggestion, however unique has potential value and agrees not to ridicule any individual or idea,
4. all suggestions are recorded verbatim, and not interpreted by anyone other than the person making the suggestion,
5. no one member of the group, regardless of his/her position in the organization, may control the flow of ideas,
6. truly unique ideas are especially valued (McClosky 128).

At the beginning of each focus session, a brainstorm session was conducted according to the steps listed above. Separate brainstorming sessions were conducted for the positive and negative perception of the HMP. Particular care was taken to assure involvement from every member and to record every reason for a particular perception. Once the participants noticed that their contributions were meaningful and began to understand how the brainstorming session was being conducted, the exchange of ideas flowed very rapidly and smoothly in each focus group.

The other quality tool listed in Table 3.1 that help managers group ideas are force field analysis. Force field analysis is used to identify the forces and factors in place that support or work against the solution of an issue or problem (Brassard [2] 63). Force field analysis was not chosen to be utilized in this research because the product of a force field analysis is limited to showing only which items are positive and negative. Although the product of a force field analysis shows managers what things are wrong or correct in the organization, it does not provide the freedom to use other grouping and deciding tools that a brainstorming session allows

**Affinity Diagrams** Once the factors that led to either a positive or negative perception had been recorded during the brainstorming session, something had to be done to begin making sense of the information. The affinity diagram is a quality tool that is used to organize and summarize natural groupings of ideas generated from a brainstorming session (Brassard [2] ed. 12). Affinity diagrams are created when the brainstorming members each place the ideas from the brainstorming session into logical groups. Each member places the idea card into the category or group that he/she feels it best belongs. Then if one idea is being moved back and forth between two categories, a

duplicate copy of the idea is made so that it may be placed in each category. Some of the ideas may stand alone if they do not fit into any of the created categories. Once a consensus has been established as to where each idea should be placed, each group of ideas is given a summary or heading card.

The other quality tool listed in Table 3.1 that helps in grouping ideas is a cause and effect diagram. The cause and effect diagram allows a team to show in increasing detail all the possible causes related to a problem (Brassard [2] 23). The cause and effect diagram was not chosen to be used in this study because its' product does not allow the ease of ranking importance among categories that can be accomplished with the affinity diagram.

**Interrelationship Digraphs (ID)** The interrelationship digraph was the last tool used in this study.

The ID allows a team to systematically identify, analyze, and classify the cause and effect relationships that exist among all critical issues so that key drivers or outcomes can become the heart of an effective solution (Brassard 76).

This tool was used to determine the cause and effect relationships that existed among the categories generated during the affinity diagram. ID's are created by laying out all of the ideas or issues that have either been brought from other tools or brainstormed. Once all the cards have been laid out in a circle, begin analyzing cause and effect relationships that exist among them. This is most easily accomplished by numbering the cards sequentially and beginning at the first card. If a relationship exists between card one and two, determine which card is most influential in the relationship and draw an arrow leading from it to the other card. Continue around the circle of cards until all possible relationships have been established (i.e., 1-2, 1-3, 1-4, 2-3, 2-4, 3-4 would be all the

possible relationships among four factors). Once this has been completed, tally the number of arrows leading out and into each card. The card or cards with the most arrows leaving them contain the factor, idea, or issue influencing the most other factors affecting the problem being analyzed and is called the “Key Driver.” The card or cards with the most arrows leading into them, though usually less important, are the “Key Outcomes.” The result of an ID is that the decision maker becomes aware of which factor or factors are the most crucial towards picking a solution.

The other quality tools designed for working with ideas and to help managers make decisions shown in Table 3.1 are: nominal group technique and radar tree.

The nominal group technique allows a group to decide the relative importance of issues, problems, or solutions by compiling individual rankings into a final ranking (Brassard [2] 56). The nominal group technique would have been good for ranking the categories of perceptions held by HMP customers, but it would not have shown how they related to one another. Due to the fact that the interrelationship digraph ranks and shows relationships between issues, it was chosen to be used in this research over the nominal group technique.

The radar chart is used to show the gaps among a number of both current organization performance area and ideal performance areas (Brassard [2] 137). This TQM tool, used to help managers make decisions, was not chosen because it also does not show how issues related to one another.

## **Limitations**

One limitation of this research is that it identifies "perceptions" from HMP customers, not objective facts. For instance, HMP customers might feel that there is lack of top level support for the HMP, but in fact this does not necessarily mean that there is actually lack of support for the HMP, just that HMP customers do not see the support. Therefore, decision makers must carefully consider the results of this study before taking action.

Another limitation of this research is that only HMP customers from Wright-Patterson Air Force Base (WPAFB) have been involved. Therefore, enough detail is being provided within this report that if a decision maker feels their situation is significantly different than that of the HMP investigated they can repeat the experiment themselves. Two focus group sessions were held with different WPAFB HMP customers in order to address the experiment's validity.

Another limitation involves the experience of the researcher with the tools used to elicit responses from HMP customers: brainstorming, affinity diagram construction, and interrelationship digraph construction. The results of these tools can be subjective, and the more experienced the researcher is in using them the less chance the results have been artificially biased.

## **Summary**

The identification of factors leading to positive and negative perceptions can be very subjective and difficult to quantify. This aspect of the research was one of the reasons that focus groups were chosen, from the literature on qualitative research designs, as the data collection method. Also, several TQM tools have been created to address this type



of subjective problem. First, brainstorming sessions were conducted to generate factors contributing to either positive or negative perceptions of the pharmacy through the use of two focus groups. Secondly, an affinity diagram was constructed to group the factors that led to positive or negative perception of the pharmacy, that could be grouped together, into logical categories. Finally, interrelationship digraphs (macro) will be used to determine which category or heading created by the affinity diagrams will be the key category of perceptions of the HMP. Also interrelationship digraphs (micro) will be created using the factors within each category of perception to identify the key factor of perception within each category. The key factor within the category identified as the key factor should pinpoint the specific area that has most impact on perceptions of the HMP. Decision makers wishing to improve the HMP should get “the biggest bang for the buck” by attacking or supporting the key areas from the analysis of negative and positive perceptions respectfully.

## **Chapter IV**

### **Results**

#### **Overview**

This section of the research effort provides analysis of the data gathered during the two focus groups. The primary objective of this study is to determine what factors influence positive and negative perceptions of the Hazardous Material Pharmacy (HMP) by its customers. During the data gathering phase of this research, several Total Quality Management (TQM) tools were used to facilitate data gathering (brainstorming), data organization (affinity diagrams), and data analysis (interrelationship digraphs). The results of the application of each tool are presented in this chapter. The data dealing with negative perceptions from both focus groups are shown first, and the factors leading to positive perceptions of the HMP follow. In reporting both the negative and positive results, the flow is as follows: brainstorming, affinity diagrams, macro Interrelationship Digraphs (IDs), and then the micro IDs. Following the groups responses a summary explaining the significance of the key results and their meaning.

#### **Factors Leading to Negative Perceptions Among Users of the HMP**

The factors which lead to negative perceptions of the HMP as reported by the Unit Environmental Coordinators (UECs) and HazMat Issue Point Managers (IPMs), hereafter referred to as the "respondents" are included in this section of the report. Where applicable, an explanation of the factors leading to negative perception is given in an attempt to increase clarity and detail.

## **Brainstorm Session**

There were 21 factors reported by the first group that led to negative perceptions of the HMP. In the second session 30 factors were reported that led to negative perceptions. Of the 21 factors elicited from the first focus group, 16 factors were the same or similar to those given by the second group. In other words, over 76% of the responses given by the first group members match those given in the second group. The high degree of similarity between groups shows consistency among UECs and IPMs, as to their perceptions of the HMP. The factors that are the same from group to group were given an identification number that matches with its similar response in the second groups brainstorming session. Factors listed without an identification number are unique to that focus group. Great care was taken by the facilitator to record the elicited responses from the group as precisely as they were stated after the focus group reached consensus on the issue. The factors in Figure 4.1.1 are listed in random order.

## **Brainstorming Session Results**

Table 4.1.1 contains the responses provided by each focus group. The numbering of responses does not imply ranking. Responses are numbered only to show their similarity to a response from the other focus group. The factors that match between groups may be more universal than those factors elicited in only one group.

**Table 4.1.1 Brainstorming Session Results**

<u>Brainstorm First Focus Group</u> <u>Factors Leading to Negative Perceptions</u>	<u>Brainstorm Second Focus Group</u> <u>Factors Leading to Negative Perceptions</u>
<ul style="list-style-type: none"> <li>1 Lack of a system administrator*</li> <li>1 Lack of computer cross-talk*</li> <li>1 Bad database</li> <li>2 Problem updating zone personnel lists*</li> <li>3 Need an operating instruction</li> <li>3 Lack of management plan</li> <li>4 Lack of top level support*</li> <li>5 Problems with information flow</li> <li>6 Job description inadequate-UEC/IPMs</li> <li>7 Needs to be a full time job-UEC/IPMs</li> <li>8 Too much being regulated*</li> <li>8 Problem justifying quantities to HMC*</li> <li>8 Problems with purchasing constraints</li> <li>8 Too tight of control by HMC*</li> <li>9 Problem - HazCode decided by Bio*</li> <li>10 False tracking*</li> </ul>	<ul style="list-style-type: none"> <li>1 Need a system administrator*</li> <li>2 Problem with zone updates as people switch zones*</li> <li>3 No clear policy</li> <li>4 Lack of senior level support*</li> <li>4 Lack of Base-wide support*</li> <li>5 Lack of communication between Bio and HMC</li> <li>5 Lack of vertical information flow-HMP to UECs and IPMs</li> <li>6 Job description inadequate (UECs and IPMs)</li> <li>6 Need a career field for HazMat managers</li> <li>7 Lack of training for UECs and IPMs</li> <li>7 Needs to be a full time job (UECs and IPMs)</li> <li>7 Lack of DHMMS training</li> <li>8 Too much material being controlled by the HMP*</li> <li>9 Misconception on HazCodes* (they change depending Bio)</li> <li>9 Problem interpreting HazCodes*</li> <li>10 Redundant MSDSs in computer cause tracking problems*</li> <li>10 MSDSs not consistent*</li> </ul>
<p align="center"><u>Responses unique to Group 1</u></p> <p>Lack of good research substitutes          Problem getting licenses processed          Problem with privacy information*          Process is too time consuming          Need more training</p>	<p align="center"><u>Responses unique to Group 2</u></p> <p>a. Need permanent HMC Employees*          a. New people (HMC) change HazCodes, procedures, etc.*          a. HMC continuity problems*          b. Problems implementing new policy*          b. Need update training, when new policies are implemented*          c. Contractors do not track material*          c. Contractors inadequately trained*          Unauthorized people still ordering material          Civilian and military authorization difference (trans HazMat)*          HMC should have MSDSs prior to ordering materials          Impact Card procedures need more checks (ordering HazMat)          Liability misconceptions (EPA mandates vs. AF mandates)          Not enough control at issue points</p>

\* Additional information is provided on the next page for items ending in an asterisk.  
 a,b,c, items with the same letter have additional information in the same paragraph  
 because of their similarity.

## **Explanation of individual factors causing negative perceptions (Asterisked Items\*)**

Additional information is provided below on some of the items contained in Table 4.1.1 that were not self-explanatory. Inclusion in the list below of does not imply any greater significance compared to those items for which no additional information is provided.

1. Lack of a system administrator. Previously, the HMP under research had an employee that was capable of providing "computer support" to HMP customers. The respondents reported this to be extremely helpful, because the data management system is very complex and sometimes causes problems.
2. Problems updating zone personnel lists. The respondents stated that when new people entered their zones they had problems getting the list updated at the HMC by the Bio-environmental (Bio) section, and without proper authorization people cannot order materials. Additionally, if everyone in your zone is not properly trained, or shown as being trained, you may have problems acquiring material to do your job. This causes problems when people switch from one section to another (i.e. paint shop to paint removal).
4. Lack of top level support, base-wide support. The respondents said that they felt if senior base leaders would "get out in front" of the HMP, their job would be easier. They felt that articles in the base newspaper and HazMat management training for the wing, not just themselves, would help them meet the needs of the people who come to them needing HazMat. Respondent's felt like more support was needed and that the additional support would also help create better policies.
8. Too much being regulated, Too tight of control by the HMC, Problems justifying quantities to the HMC. Respondents felt that some items were unnecessarily tracked by the HMP, causing unnecessary problems. Also, a respondent stated, "that he knows his mission better than the HMC so why should he have to waste time, energy, and paperwork just to tell the HMC that he needs a certain amount of HazMat". One reason that justifying quantities upset the individual is that his organization gets a large majority of their budget at the end of the year, and if the money is not obligated then they cannot get the materials they need to perform their mission.
9. Problems with how HazCodes are decided, interpreting HazCodes. Respondents felt that they did not understand how Bio codes potentially hazardous materials. They felt that depending upon the Bio personnel currently in the HMP position, (The HMP is usually staffed by personnel given up by their respective career centers for terms of about one year, in most cases.) a material could be coded as Hazardous one month and then be determined not hazardous the next, and vice versa.

10. False tracking, MSDSs not consistent. Respondent's stated that sometimes they would call to check on the status of their order and would be given false or erroneous information. They linked the cause of this to problems with the computer data system and multiple MSDSs containing different information being in the system, at the same time, for one material. They also stated that MSDSs from the manufacturer often do not provide consistent information for the same material.

Unique Responses from Group 1:

Problems with privacy information. Respondents stated that they did not like having to use their Social Security Numbers (SSN) on orders for material. They said they liked a previous system in which they were each given unique numbers, different from their SSN by the HMP, to use instead of their SSNs.

Unique Responses from Group 2:

a. Need permanent HMC employees, HMC continuity problems. The respondents felt that the HMP would be more effective if the HMP had permanent employees, instead of personnel that rotate periodically from their career center (Bio, Supply, Contracting, EM, etc.) to the HMP and back to their career center. They felt that HMP employee knowledge and training would be much better if HMP employees stayed in the HMP. They also said that in addition to the problems of low HMP experience, new HMP personnel changing programs, HazCodes, etc. was frustrating to the respondents.

b. Problems implementing new policy, need update training. Respondents stated that they felt that their initial training was adequate, but that when a new program (i.e. impact card purchases and freebies program) was introduced they were inadequately trained to understand how to operate the new program effectively. They also stated that they would like periodic update training to remain current on HazMat management issues and programs on the base.

c. Contractors inadequately trained, contractors do not track material. Respondents felt that contractors working on base were not operating, or inadequately operating under the HMP program. They said, that they thought that contractors were bringing HazMat on base and not going through the HMP, which is supposed to be the single point of control for HazMat entering the base. The respondents also stated that due to some contractors lack of knowledge they (the UECs and IPMs) were pulled away from their jobs to remedy or answer problems caused by base contractors.

Civilian and military authorization differences to transport HazMat When performing Air Force reserve duties reservists can transport HazMat under a less stringent set of rules than when they are performing their roles as a civil service employees. It was said, "why not make it just as easy for a civilian employee to transport HazMat...after all we are all doing the same job."

Unauthorized people still ordering material. The respondents said that in some instances base personnel who are not authorized to order HazMat are doing so. They cited the lack of awareness of the correct procedures as the problem.

## Affinity Diagrams

After each brainstorming session, cards containing the factors given during the brainstorm session were sorted into groups of similar items, until consensus was reached by the group that all the cards were in proper groupings. Each groups of cards was then assigned a heading. The affinity diagram contains all of the information from the brainstorm session in a manner that facilitates understanding.

Affinity Diagram - Table 4.2.1

### First Focus Group: Negative Perceptions of the HazMat Process and Causes

<u>INFORMATION</u>	<u>HMC ISSUES</u>	<u>PERSONNEL</u>	<u>MANAGEMENT</u>	<u>SUPPLY</u>
Lack of System Administer	Problems updating zone personnel lists	Need for an Operating Instruction	Lack of top level support	Lack of good research for substitutes
Problems with information flow	Problem justifying quantities	Job Description not adequate/ non-existent	Lack of management plan	Process is too time consuming
Lack of computer cross-talk	Problems getting licenses processed	Problem with privacy information	Need more training	Problems with the purchasing constraints
Bad database		Needs to be a full time job (UECs & IPMs)	Too much being regulated	Problems with how HazCode is decided
False tracking			Too tight control	

Affinity Diagram - Table 4.2.1

Second Focus Group: Negative Perceptions of the HazMat Process and Causes

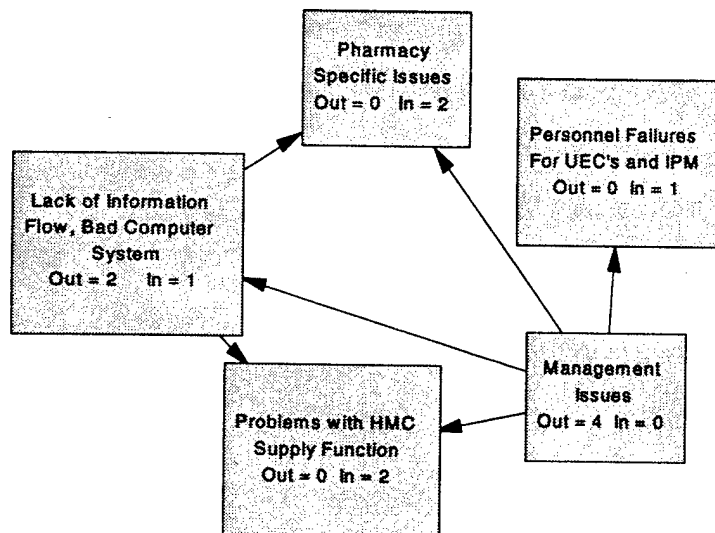
<u>POLICY</u>	<u>HMC PROBLEMS</u>	<u>TRAINING</u>	<u>INFORMATION FLOW</u>	<u>JOBS</u>
No Clear Policy	Need permanent HMC employees	Lack of training	Lack of comm. between Bio & HMC	Need a career field for HazMat managers
Lack of Senior Level Support	HMC personnel continuity problems	Need for update training	Need a system administrator	Needs to be a full time job
Lack of Base-wide support	Misconception between HazCodes	Lack of DHMMS training	Lack of Vertical information flow	Job Description inadequate
Problem interpreting HazCodes	Too much material being controlled	Unauthorized people ordering mat'l	Redundant MSDSs in computer	
Contractors don't track mat'l	New people (HMC) change HazCodes, procedures, etc.	Contractors inadequately trained	Problems with the zones and Bio	
HMC should have MSDSs prior to ordering materials	Impact card needs checks	Liability Misconceptions		
Not enough control at HazMat at issue point	MSDSs not consistent			
Civilian and Military authorization differences				
Problems implementing new policy				



## Interrelationship Digraphs (Macro View)

The Interrelationship Digraphs (ID) show influence relationships between the headings created from the affinity diagram. The approach assumes that the factor having the most arrows originating from it influences the most other factors. The factor with the most arrows originating from it is called the Key Driver. The factor being influenced the most by other factors is the one with the most arrows leading into it. It is called the Key Outcome. Identification of the key drivers of negative and positive perceptions of the HMP is the objective of this research. Figures 4.3.1 and 4.3.2 show the macro view (using the headings from the affinity diagrams) of factors leading to negative perceptions of the pharmacy, and identifies the key driver in the group of categories.

Figure 4.3.1 Macro ID, First Focus Group, Factors Leading to Negative Perception



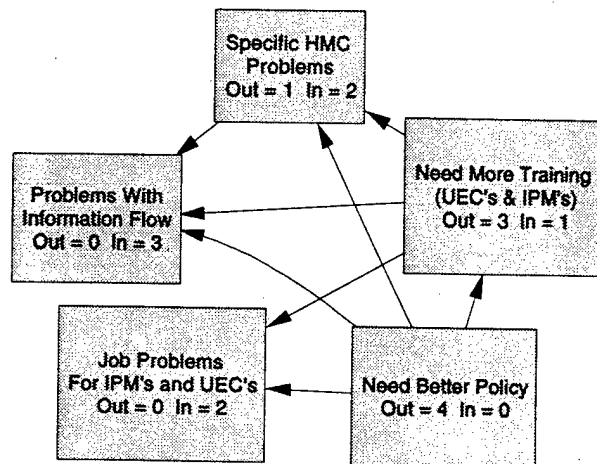
Key Driver: Management Issues

Key Outcome: Problems with the HMC Supply Function, Pharmacy Specific Issues

This ID shows that Management Issues is the key driver of negative HMP perceptions. Included under the heading of Management Issues were five factors: Lack of Top Level Support, Too Much Being Regulated, Too Tight of Control by the HMC, Need More

Training, and Lack of Management Plan. It is important to note that during the focus group, lack of management plan kept recurring as a theme of subsequent discussions.

Figure 4.3.2 Macro ID, Second Focus Group, Factors Leading to Negative Perception



Key Driver: Need Better Policy

Key Outcome: Problems With Information Flow

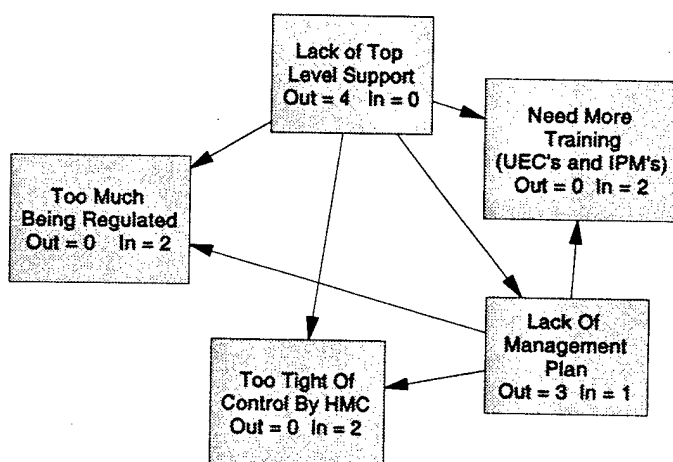
The results of focus group #2's ID shows that Need For Better Policy is the key driver affecting to negative perceptions of the HMP. This ID identifies the key outcome as Problems With Information Flow.

### Interrelationship Digraphs (Micro Views)

The following ten IDs represent all of the factors contributing to Negative Perceptions (NP) that were generated during the brainstorm sessions. Each ID is made up of the items that were placed into a particular heading during the construction of the affinity diagram.

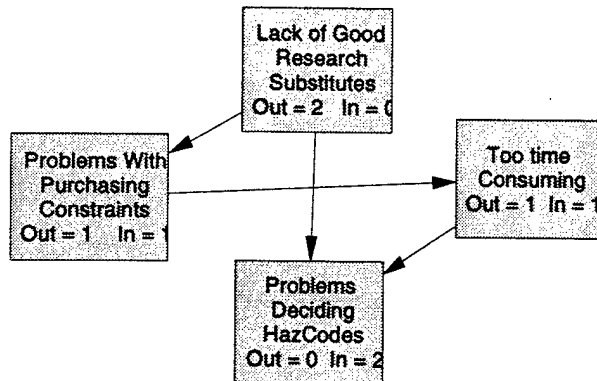
These IDs can be of particular interest for managers or decision makers wishing to make specific changes in the HMP program. For instance, the macro ID created from the first focus group's affinity diagram shows that "Lack of Management Plan" was the most influential factor resulting in negative perceptions. Figure 4.4.1 shows the relationships and influence within the category of "Lack of Management Plan." In other words, Figure 4.4.1 will show what factor influences the most other factors of negative perception, within the Lack of Management Plan heading. Figures 4.4.1 through 4.4.5 were created during the first Focus Group (FG) and Figures 4.4.6 through 4.4.10 were created during the second focus group. Additional discussion of the micro IDs analysis is contained in the Results Summary section of this chapter.

Figure 4.4.1 Management (1<sup>st</sup> FG, Negative Perceptions)



Key Driver: Lack of Top Level Support  
Key Outcome: Non Specific

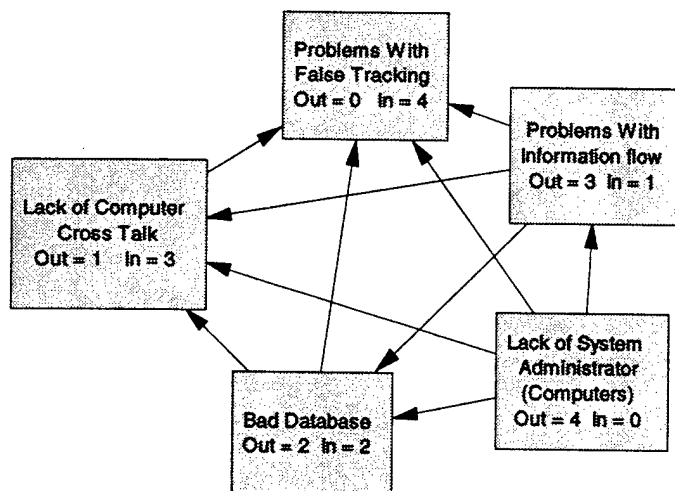
Figure 4.4.2 Supply, (1<sup>st</sup> FG, NP)



Key Driver: Lack of Good Research Substitutes

Key Outcome: Problem Deciding HazCodes

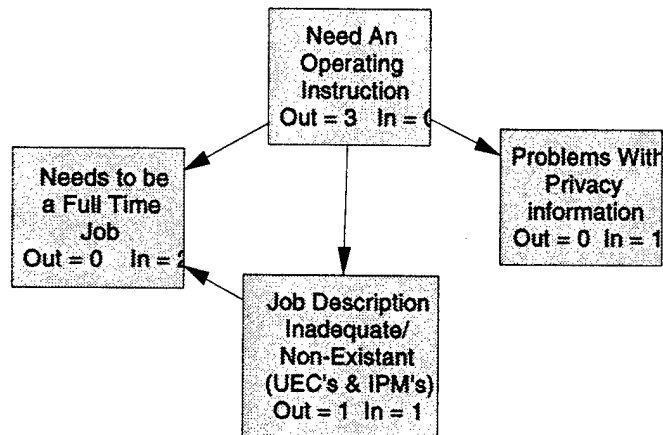
Figure 4.4.3 Information, (1<sup>st</sup> FG, NP)



Key Driver: Lack of a System Administrator

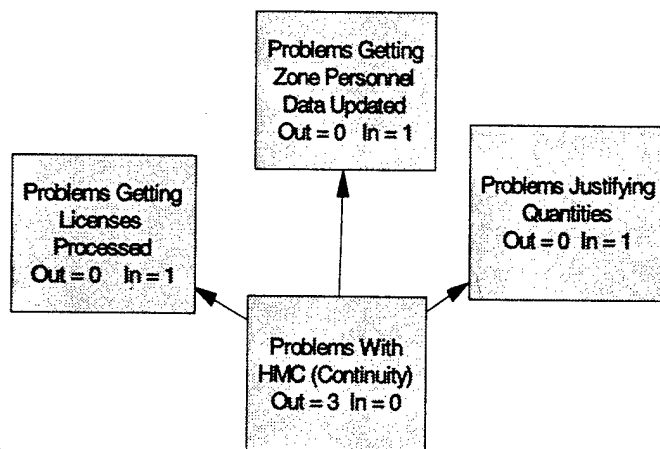
Key Outcome: Problems with False Tracking

Figure 4.4.4 Personnel, (1<sup>st</sup> FG, NP)



Key Driver: Needs to be an Operating Instruction  
Key Outcome: Needs to be a Full Time Job

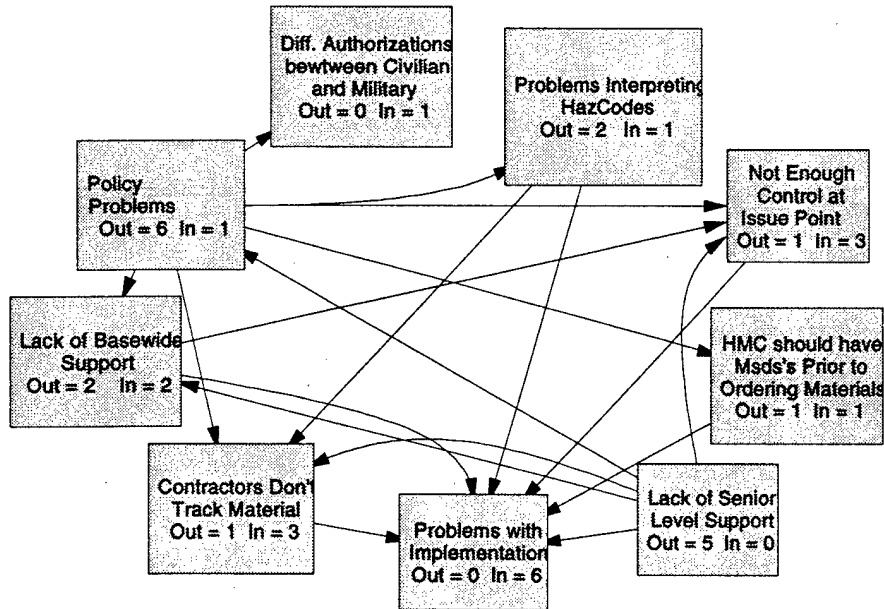
Figure 4.4.5 HMC Specific Issues, (1<sup>st</sup> FG, NP)



Key Driver: Problems with HMC Continuity  
Key Outcome: Non-Specific

## Second Focus Groups Micro ID's For Negative Factors of Perception

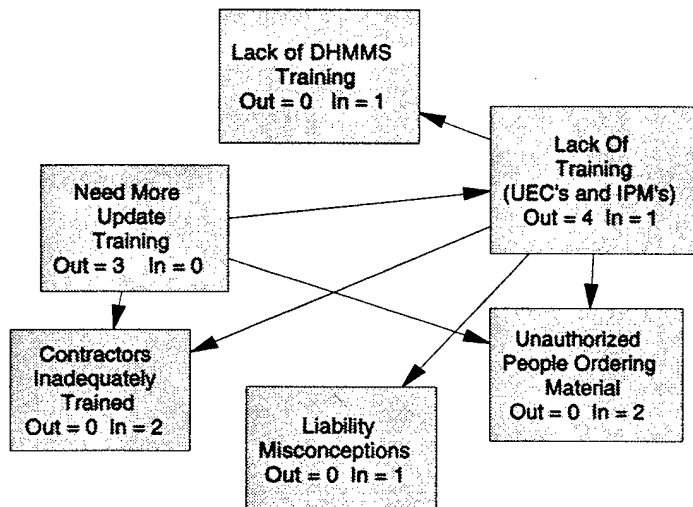
Figure 4.4.6 Policy, (2<sup>nd</sup> FG, NP)



Key Driver: Policy Problems & Lack of Senior Level Support

Key Outcome: Problems with Implementation

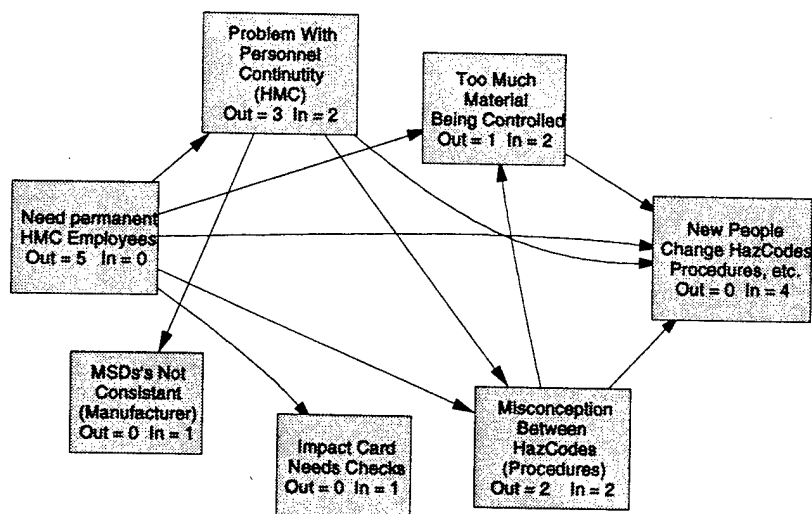
Figure 4.4.7 Training, (2<sup>nd</sup> FG, NP)



Key Driver: Lack of Training

Key Outcome: Non-Specific

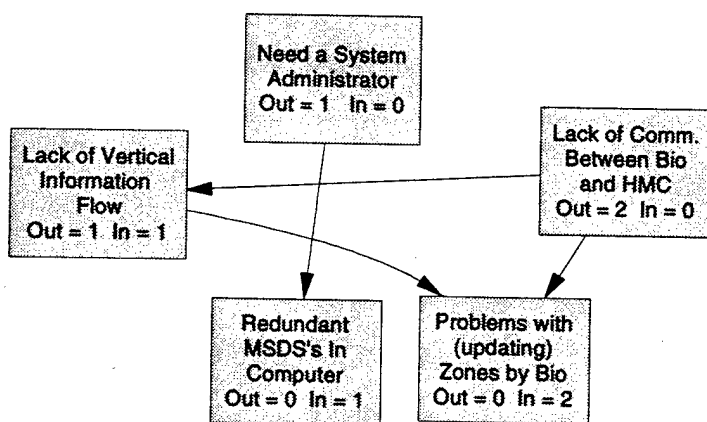
Figure 4.4.8 HMC Problems Specific, (2<sup>nd</sup> FG, NP)



Key Driver: Need permanent Employees at the HMC

Key Outcome: New People Change HazCodes, Procedures, etc.

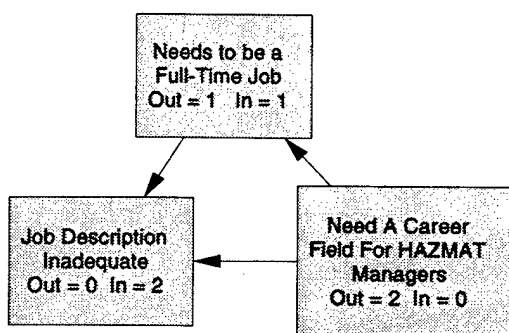
Figure 4.4.9 Information Flow, (2<sup>nd</sup> FG, NP)



Key Driver: Lack of Communication Between Bio and HMC

Key Outcome: Problems Updating Zones

Figure 4.4.10 Jobs (UECs and IPMs), (2<sup>nd</sup> FG, NP)



Key Driver: Need a Career Field For HazMat Managers

Key Outcome: Job Description is Inadequate/ Non-Existent

**Results Summary: Factors leading to negative Perceptions of the HMP**

Table 4.4.11 shows the category and its contents identified by each of the two focus groups as influencing the most other categories of the factors leading to negative perceptions of the HMP.

**Table 4.4.11**

1 <sup>st</sup> Group	2 <sup>nd</sup> Group
<u>MANAGEMENT</u>	<u>POLICY</u>
Lack of top level support	No Clear Policy
Lack of management plan	Lack of Senior Level Support
Need more training	Lack of Base-wide support
Too much being regulated	Problem interpreting HazCodes
Too tight control	Contractors don't track material
	HMC should have MSDSs prior to ordering materials
	Not enough control at HazMat at issue point
	Civilian and Military authorization differences
	Problems implementing new policy



## Positive Perception Results:

The positive perception results are presented in the same manner as were the negative perceptions. First, the raw responses from the brainstorm session are shown and responses that are the same or similar between groups are marked. Second, the affinity diagrams are shown from each focus group. Finally, the macro and micro IDs constructed by the two focus groups are shown. Table 4.5.1 shows the results of the two brainstorming session of factors of positive perception.

Table 4.5.1 Brainstorm Session: Factors Causing Positive Perceptions of the HMP

<b><u>Brainstorm First Focus Group</u></b> <b><u>Factors Leading to Negative Perceptions</u></b>	<b><u>Brainstorm Second Focus Group</u></b> <b><u>Factors Leading to Negative Perceptions</u></b>
<ol style="list-style-type: none"><li>1. Better knowledge</li><li>2. Ensures good HazMat housekeeping</li><li>3. Helpful long-term for the environment</li><li>4. Good HazWaste pick-up program</li><li>5. People are more aware of hazards</li><li>6. Encourages good recycling*</li><li>6. Good excess database*</li><li>7. Less shelf life expired material</li><li>7. Reduced waste</li><li>8. Saves money*</li><li>9. IMPAC Card*</li><li>10. Reduced storage</li><li>11. Helps with ECAMP inspections</li><li>12. Environmentally friendly products*</li></ol>	<ol style="list-style-type: none"><li>1 Raised awareness of env. Hazards</li><li>2 Reduced stockpiling of HazMat</li><li>3 Helps prevent misuse of material</li><li>4 Helps get rid of excess HazMat</li><li>5 Increased worker safety for personnel</li><li>6 Good sharing program*</li><li>7 Reduced waste</li><li>7 Helps you get the right quantity</li><li>8 Saves money (less fines)*</li><li>9 Impact card makes it easier to get mat'l*</li><li>10 Reduced storage</li><li>11 Uniform operating system helps w/compliance</li><li>12 Reduced use of HazMat*</li></ol>
<p><b><u>Unique Responses to Group One</u></b></p> <p>Beneficial AFIT training courses Knowledge transfers from work to home Better environmental practices at home Volunteer status of IPMs and UECs* Job enrichment* Amnesty period* Good for outside career opportunities Management success running new programs*</p>	<p><b><u>Unique Responses to Group Two</u></b></p> <p>HMC personnel try to help and are cooperative Individual exposure record keeping Good for tracking HazMat/HazWaste Get material faster Good for reporting EPCRA requirements</p>

\* Items with an asterisk following them are explained in greater detail on the next pages.

The two brainstorm sessions revealed that many of the same issues influence positive perceptions of the HMP. In the first focus group, 22 factors were reported as leading to positive perceptions of the HMP; the second group reported 18 positive factors. Thirteen responses from group two match responses from group one (72%). This similarity in responses shows that a degree of uniformity exists between HMP customer perceptions as to the causes of positive perceptions. The items that are similar between groups may be more universally felt by HMP customers than those only given by one group.

**Explanation of individual factors causing positive perceptions (Asterisk Items\*)**

6. Encourages good recycling, good excess database, good sharing program. These three comments were all given in regards to the HMP's HazMat sharing program. The sharing program works by letting the HMP know that you have HazMat that you do not need or that will expire before it can be used. The HMP then gives access to this information to any other units on the base, or in some cases in the Air Force. This practice helps save money in two ways; the losing unit does not have to pay for the HazWaste disposal, and the gaining unit gets the HazMat for free.

7. Saves money. The respondents in group one realized that the HMP saves money in a variety of ways. The respondents in group two stated that the HMP helps prevent fines, which in turn saves money. Some of the ways that were discussed that the HMP saves money are: reduced storage, reduced tracking, reduced disposal, reduced HazMat ordered, and improved worker safety.

9. IMPAC Card. The base at which this research was conducted just changed some of the ordering procedures for HazMat purchasing. units can now use the International Merchant Purchase Authorization Card (IMPAC) to order materials for orders up to \$2,500. The respondents all felt that this made their jobs much easier and that materials arrived faster.

12. Environmentally friendly products, Reduced use of HazMat. The first focus group stated that the materials substitution program caused them to have positive perceptions of the HMP. The second group said they thought the HMP causes reduced use of HazMat, which helped them to have a positive perception of the HMP.

**Unique Responses to Group One:**

Job Enrichment, Volunteer status of UECs and IPMs. Group one felt that through their jobs they were helping the environment. They also felt that because they volunteered for

the job or additional duty of IPM or UEC that they got additional intrinsic rewards, which in turn help to create a positive perception of the HMP.

Management Success Running New Programs. The respondents in group one felt that the HMP manager was doing a good job by making improvements to the system and introducing several new programs. The programs that were specifically mentioned were the excess program (freebies), an amnesty period (that occurred several years ago in which all units were encouraged to turn all HazWaste without threat of retribution), the HazMat delivery and pick up program (Usually orders that are placed for materials currently stored in the HMP's warehouse are delivered the same day to the unit), and the HazMat purchasing changes involving the IMPAC card that were mentioned above.

**Affinity Diagrams:** After each brainstorm session, cards containing the factors generated during the brainstorm sessions were sorted into groups of similar items until consensus was reached by the group that all related topics were grouped together. Each of these groups was then assigned a heading. Figures 4.6.1 and 4.6.2 are the two affinity diagrams

**Table 4.6.1 Affinity Diagram, Positive Perceptions First Focus Group**

<b>PROGRAMS</b>	<b>PERSONAL</b>	<b>KNOWLEDGE</b>	<b>REDUCED HAZWASTE</b>	<b>PROTECTS ENVIRONMENT</b>
Management success running new programs	Beneficial AFIT training courses	Better Knowledge	Encourages Good HazMat Housekeeping	Helpful long-term for the environment.
Good HazWaste pick-up	Volunteer status of UECs & IPMs	People more aware of hazards	Encourages Recycling	Env. Friendly products
Good excess database	Job Enrichment	Knowledge transfers from work to home	Less shelf life expired mat'l	Better env. Practices at home
Amnesty period	Good for outside career opportunities		Reduced waste	Saves \$
Impact card			Reduced Storage	
ECAMP			Saves \$	
Saves \$				

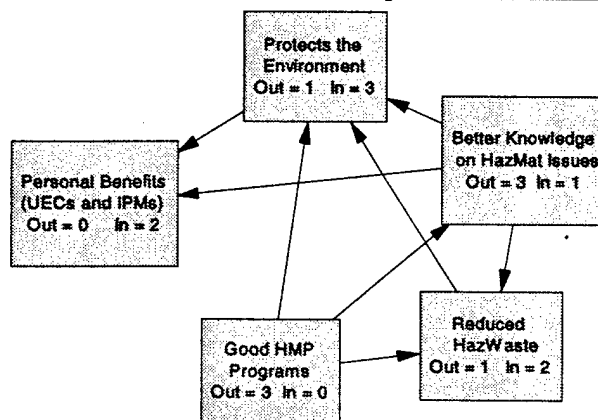
**Table 4.6.2 Affinity Diagram, Positive Perceptions Second Focus Group**

<u>MATERIALS</u>	<u>PERSONNEL SAFETY</u>	<u>SUPPLY</u>	<u>COMPLIANCE</u>
Helps you get the right quantity	Raised awareness of env. Hazards	HMC personnel try to help and are cooperative	Uniform operating system helps with compliance
Reduced use of HazMat	Increased work safety for personnel	Impact card makes it easier to get material	Helps prevent misuse of material
Helps get rid of excess HazMat	Good for individual exposure recording	Good for tracking HazMat/HazWaste	Reduced waste
Good Sharing program		Get material faster	Good for reporting EPCRA requirements
Reduced stockpiling			Saves money (less fines)
Reduced storage			

**Interrelationship Digraphs (Macro View)** The Interrelationship Digraphs (ID) show influence relationships between the headings generated by the affinity diagramming.

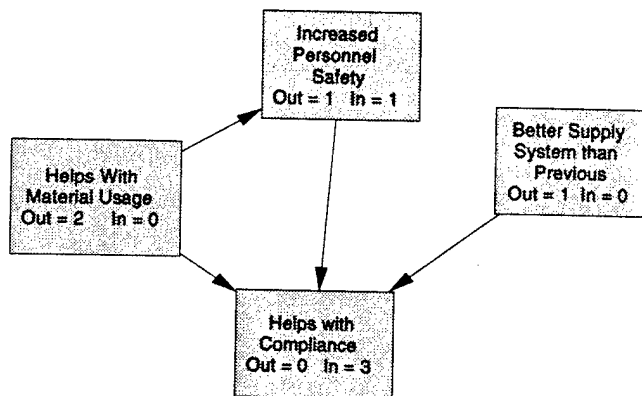
Figure 4.7.1 was created using the first focus groups affinity diagram and Figure 4.7.2 was created using the second's

**Figure 4.7.1 ID First Focus Group - Macro -Factors Leading to Negative Perception**



**Key Driver:** Good HMP Programs, and Better Knowledge on HazMat Issues  
**Key Outcome:** Protects the Environment

Figure 4.7.2 ID Second Focus Group - Macro -Factors Leading to Negative Perception

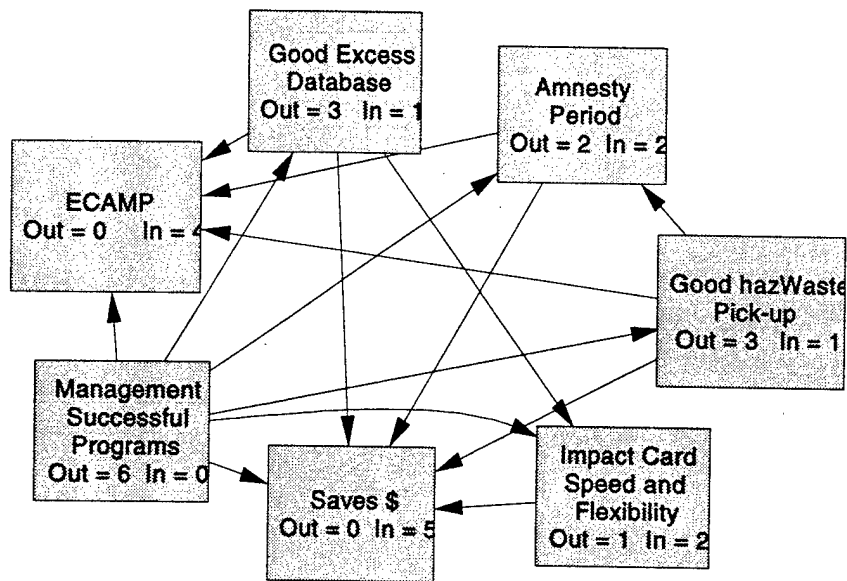


Key Driver: Helps with Material Usage  
Key Outcome: Helps with Compliance

### Interrelationship Digraphs (Micro Views)

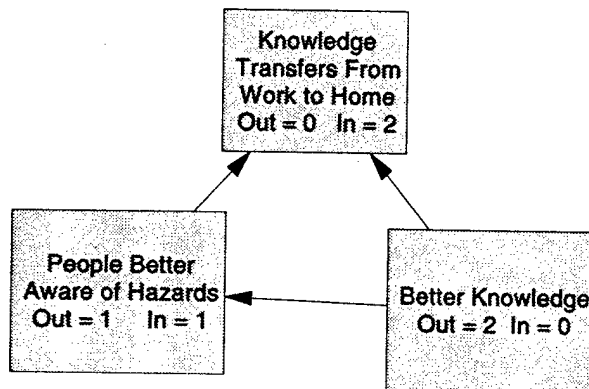
The following ten IDs represent all of the factors identified as sources of positive HMP perception during the brainstorm sessions. The micro IDs show influence in the same way as do the macro IDs. However, each micro ID is made up of the factors of positive perception that were placed into a particular heading during the construction of the affinity diagram, versus comparing the different headings that were created during the affinity diagram construction. Figures 4.8.1 through 4.8.5 were constructed by the first focus group for Positive Perceptions (PP) and figures 4.8.6 through 4.8.9 were constructed by the second focus group for PP.

Figure 4.8.1 HMP Programs, (1<sup>st</sup> FG, PP)



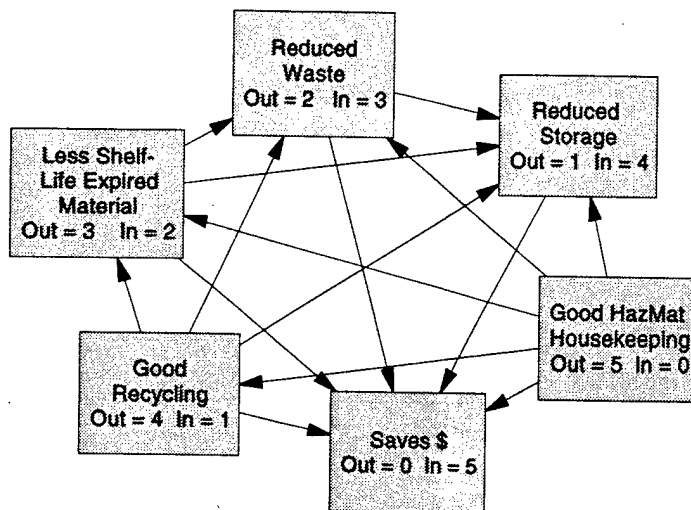
Key Driver: Management's Successful Programs.  
Key Outcome: Saves \$

Figure 4.8.2 Knowledge, (1<sup>st</sup> FG, PP)



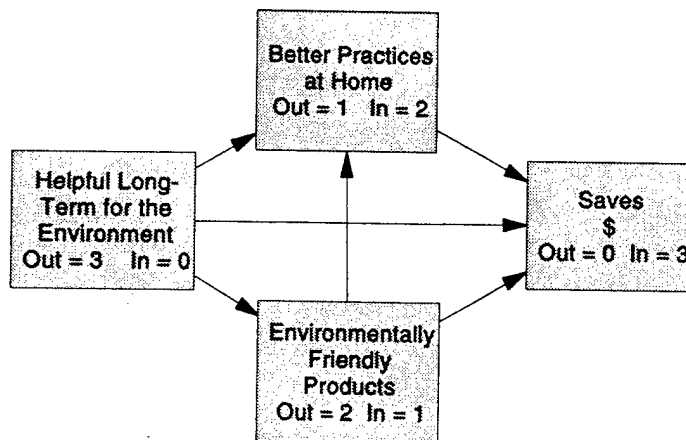
Key Driver: Better Knowledge  
Key Outcome: Knowledge Transfers From Work To Home

Figure 4.8.3 Reduced Waste, (1<sup>st</sup> FG, PP)



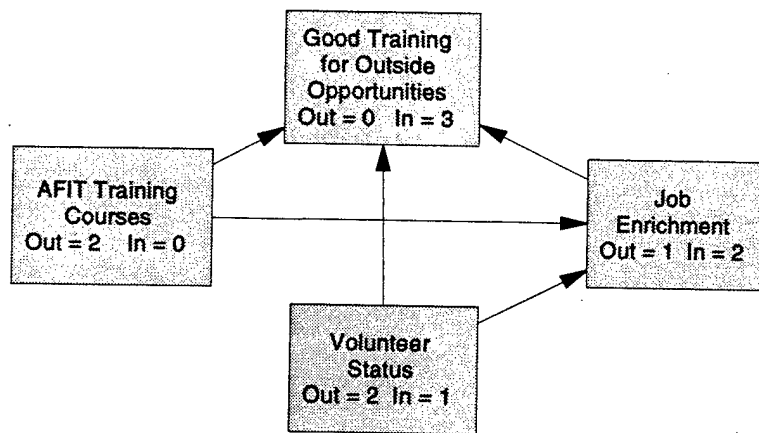
Key Driver: Good HazMat Housekeeping  
Key Outcome: Saves \$

Figure 4.8.4 Protects the Environment, (1<sup>st</sup> FG, PP)



Key Driver: Helpful Long-Term for the Environment  
Key Outcome: Saves \$

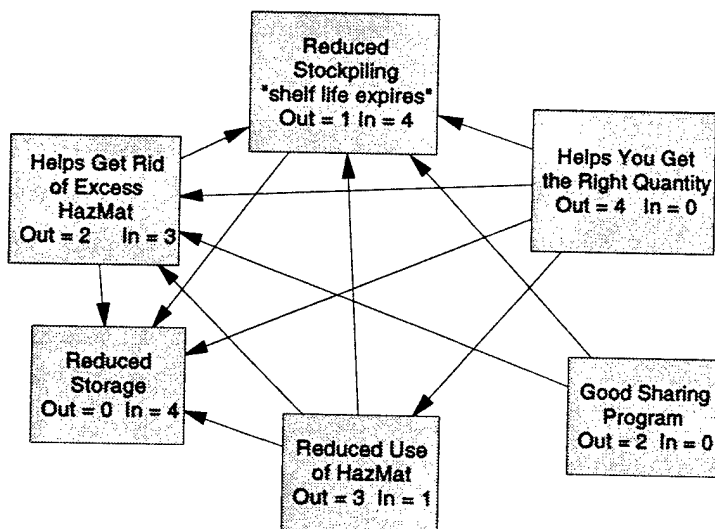
Figure 4.8.5 Personal Benefits, (1<sup>st</sup> FG, PP)



Key Driver: AFIT Training Courses, Volunteer Status  
Key Outcome: Good Training for Outside Opportunities

## Second Focus Group - Micro ID Positive Perceptions

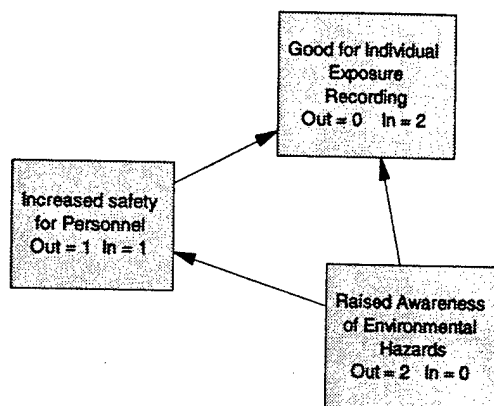
Figure 4.8.6 Materials, (2<sup>nd</sup> FG, PP)



Key Driver: Helps You Get The Right Quantity  
Key Outcome: Reduced Stockpiling, "Shelf Life Expires"

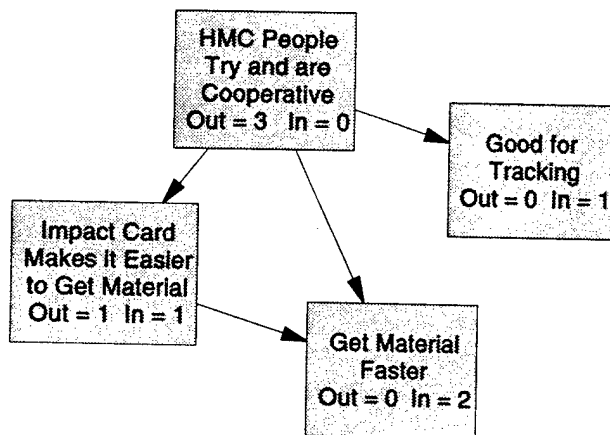


Figure 4.8.7 Personnel Safety, (2<sup>nd</sup> FG, PP)



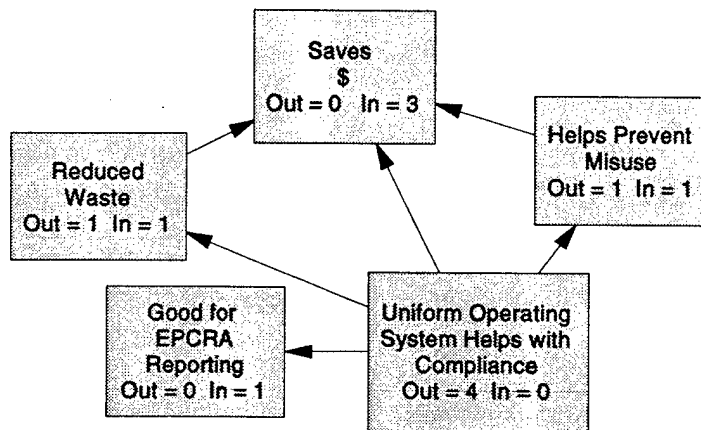
Key Driver: Raised Awareness of Environmental Hazards  
Key Outcome: Good for Individual Exposure Recording

Figure 4.8.8 Supply Issues, (2<sup>nd</sup> FG, PP)



Key Driver: HMC People Try and are Cooperative  
Key Outcome: Get Material Faster

Figure 4.8.9 Compliance, (2<sup>nd</sup> FG, PP)



Key Driver: Uniform Operating System Helps with Compliance

Key Outcome: Saves \$

**Results Summary: Key Factors leading to Positive Perceptions of the HMP**

Table 4.8.10 shows the category and its contents identified by each of the two focus groups that influences the most other categories of factors leading to positive perceptions of the HMP. Two categories are shown under the first focus group because they both tied as influencing the most categories in the macro ID

**Table 4.8.10: Key Factors of Positive Perception**

<b>1<sup>st</sup> Group</b>	<b>1<sup>st</sup> Group</b>	<b>2<sup>nd</sup> Group</b>
<u>Good HMP Programs</u>	<u>Better Knowledge</u>	<u>Helps with Material Usage</u>
Management successful programs	Better Knowledge	Helps you get the right quantity
Good HazWaste pickup	People more aware of hazards	Reduced use of HazMat
Good excess database	Knowledge transfers work to home	Helps get rid of excess HazMat
Amnesty period		Good sharing program
Impact card		Reduced stockpiling - shelf life expires
ECAMP		Reduced storage
Saves \$		

**Results Summary:** Table 4.9.1 summarizes the findings on negative perception of the HMP from both focus groups. In the category ranking column, the headings created during the affinity diagram are ranked based upon the macro ID that showed which categories influenced the most other categories. The categories are numbered according to their rank, and categories that tied are given the same number. The key drivers and outcomes within each category are also shown.

**Table 4.9.1 Results Summary - Factors of Negative Perception**

	<b><u>Category Rankings</u></b> (from macro ID) (highest to lowest)	<b><u>Key Driver(s)</u></b> (from micro ID) (within category)	<b><u>Key Outcome(s)</u></b> (from micro ID) (within category)
<b><u>1<sup>st</sup></u></b> <b><u>Group</u></b>	1 Management issues  2 Information system  3 HMP specific issues  3 Problems-supply function  3 Personnel system failures	Lack of top level support, Lack of management plan  Lack of system admin.  Continuity of personnel at HMC  Lack of good HazMat substitutes  Need an Operating Instruction	Non-Specific  False tracking  Non-Specific  Problems deciding HazCodes  Needs to be a full time job
<b><u>2<sup>nd</sup></u></b> <b><u>Group</u></b>	1 Need better policy  2 Need more training  3 Specific HMC problems  4 Problems with information  4 Job problems for UEC, IPM	Policy problems, Lack of senior level support  Lack of training  Need permanent employees-HMC  Lack of comm. Between Bio- HMC  Need career field for HazMat managers	Problems with implementation  Untrained people order HazMat, Contractors inadequately trained  New people change HazCodes, etc.  Problems updating zones  Job Description inadequate

Table 4.9.2 reports the finding on positive perceptions from HMP customers in the same manner as Table 4.9.1.

**Table 4.9.2 Results Summary - Factors of Positive Perception**

	<u>Category Rankings</u> (from macro ID) (highest to lowest)	<u>Key Driver(s)</u> (from micro ID) (within category)	<u>Key Outcome(s)</u> (from micro ID) (within category)
<u>1<sup>st</sup></u> <u>Group</u>	1 Good specific programs  1 Better knowledge on HazMat issues  2 Reduced HazWaste  2 Protects the environment  3 Personal benefits	Management successes  Better knowledge  Good HazMat housekeeping  Helpful long-term for the env.  Volunteer status	Saves \$  Transfers from work to home  Saves \$  Saves \$  Good training for outside opportunities
<u>2<sup>nd</sup></u> <u>Group</u>	1 Helps with mat'l usage  2 Increased personnel safety  2 Better supply system than previous  3 Helps with compliance	Helps you get the right quantity  Raised awareness of env. Hazards  HMC try and are cooperative  Uniform operating system helps	Reduced storage  Good-individual exposure recording  Get material faster  Saves \$

## Analysis

The previous sections of this chapter have reported the responses given by the UECs and IPMs during the two focus groups and how that information was processed by the TQM tools used in this study. The analysis section of the report shows the significant findings of the TQM tools, the meaning of those results, some additional insights, areas for improvement and suggested solutions, the costs of control, some added benefits of an effective HMP program, and the final recommendations of this study.

### Significant Findings of TQM Tools:

#### Negative Perception Factors

This research shows that the leading category of causes of negative perceptions from each group are Management Issues and Need Better Policy. The key drivers of each of these categories are *Lack of Top Level Support* and *Lack of Management Plan* as reported by group one, and *Policy Problems* and *Lack of Senior Level Support* as reported by group two. The striking similarity between what came out to be the leading cause of negative perception from each of the two groups is significant. In fact, 4 out of 5 of the categories of negative perception were similar between groups. The four categories that lead to negative perception among both groups are paraphrased as: Policy, Information, Specific Problems, and Personnel Problems (see Tables 4.2.1 and 4.2.2, affinity diagrams on negative perceptions for more detail).

#### Positive Perception Results

The leading category of causes of positive perceptions from focus groups one and two was Good Specific Programs and Helps with Material Usage. The key driver of each of

creation of a career field for HazMat managers, would only reduce or eliminate that one factor of negative perception (as presented by Figure 4.3.2). Knowing the relationships that exist between categories and factors of perception gives decision makers information that can be used to obtain the biggest bang for their buck when making improvements to a system, both by acknowledging potential synergy and by identifying areas where improvement in one category might adversely affect another.

### **Inter-group Consistency/Inconsistency**

As the significant findings section points out, there was a high degree of consistency among IPMs and UECs in regard to factors (76%) and categories (80%) that cause negative perception of the HMP. However, although the factors generated for positive perception were similar between groups (72%), the categories created for the factors were different (20%) between the two groups. The difference in categories of positive perception between the two focus groups exists because each group saw different similarities among the factors of positive perception and gathered them into different types of categories. This phenomenon suggests that HMP customers are more keenly aware of the underlying causes negative perceptions than they are of the causes of their positive perceptions.

The consistency among the factors leading to perception between groups indicates that HMP customers see many issues in the same way. If both focus groups had identified totally different sets of factors leading to perception it could indicate that there are no universal factors of perception and that not all the factors of perception had been identified (a third group could come up with more and different factors than the first two

groups). Additionally, if one group identified a factor as attributing to negative perception and the other focus group identified the same cause as attributing to positive perception, it would be difficult to make meaning of such results. Such a situation as the one presented above would make it difficult for decision makers to effectively improve the HMP, because no universal “fix” would exist. However, the consistency among the two groups’ factors of perception indicates that the causes of perception felt by most HMP customers have been drawn out by this research. This consistency also suggests that a third focus group would not likely identify many new causes of perception and that the identification of a “major” cause of perception not already identified by the first two groups would be relatively unlikely.

The fact that the two groups moved factors of positive perception into different categories does not suggest that there exists a divergence of what HMP customers feel causes positive perception. It merely shows that the two groups used different subjects with which to group the factors of positive perception. Additionally, in the macro IDs created for positive perception, the lead category does not stand out on its own. In fact, the macro ID (Figure 4.7.1) created by the first focus group shows two categories tied as having the largest spans of influence; and in the macro ID (Figure 4.7.2) created by the second focus group, the lead category influences only two other categories. The result of the difference in groupings among positive perceptions is that no clear category or factor (if there is one) leading to positive perception among HMP customers stands out as most influential.

The macro IDs created by the two groups for negative perception (Figures 4.3.1 and 4.3.2) show much more clearly what factors have the most influence over other factors.



In fact, the major cause identified by each macro ID has influence over all other categories of negative perception for each focus group. The implication between the positive and negative findings is that possibly HMP customers spend more time focusing on the causes of negative perception and have developed more distinct opinions amongst themselves on that subject than for positive perceptions.

### **Additional Insights**

Although management tools or models are designed to bring out the most pertinent information to decision makers, it is also often valuable to describe “how” one reached a destination and the things that were learned along the way in addition to just the end result. Decision makers that put blind trust in numbers, some model, or a new technique are asking for trouble. Therefore, this section of the study is designed to bring to light the items that can be described as occurring behind the scene and some opinions and insights of the researcher gained during this study. The first part of this section will describe the attitudes of respondents and the atmosphere that existed during the focus groups. Then the observed opinions and desires of the respondents for the HMP system will be compared against the observed characteristics of the current pharmacy system to see if any significant gaps exist. These gaps identify opportunities for improvement in the current HMP program. This last section of the report is specifically designed to give decision makers more information than just what the TQM tools used in this study provide.

### **Attitudes and Atmosphere Observed During the Focus Groups**

The observed attitudes of the respondents towards the HMP and their jobs followed a consistent trend between the two focus groups. The respondents felt that the current system the HMP uses can be improved. They indicated a willingness to work under the current system because their job dictates that they do so. In other words, the respondents were saying, "the Air Force pays me and if the Air Force wants it done one way then I'll do it that way," even if there is a better way. Many of the respondents had been working with the HMP for quite some time and did not believe that their opinions of the HMP system had been heard or mattered over the years. There was also a general feeling among the respondents that aspects of the current HMP program hinder their ability to perform their duties, which causes them considerable frustration. It was also observed that the vast majority of the respondents were interested in doing a good job in their role as a UEC or IPM.

The atmosphere of both focus groups was a positive one. All of the respondents came to the focus groups as willing volunteers. When called and asked to participate in this study, most UECs and IPMs were eager to become involved. During the portion of the focus group on negative perceptions the respondents were energetic and able to quickly mention the things that caused them dissatisfaction. They were often able to relate to each others' comments, and had several examples to back up their cause for negative perception. However, during the positive perception portion of the focus group, respondents were not able to answer as quickly. The respondents seemed to be strained and searching for answers during the positive perception portion of the meeting, and they had a hard time relating the causes of positive perception among one another and finding

examples. The atmosphere of each focus group remained positive and constructive throughout the three-and-a-half hours of each meeting.

### **Customer Desires, Current System Characteristics & Areas For Improvement**

After observing the two focus groups discuss causes of positive and negative perception of the HMP, several summary points can be made on what the customers seem to feel the current system lacks. The use of a bullet format will be used to more clearly show the observed desires of HMP customers and the observed current characteristics of the HMP system in order to identify where specific gaps exist.

#### **Observation Of What Customers Indicated**

- They want information to be processed quickly and accurately.
- They want both the personnel and the HMP system to take care of their needs.
- They want people in the HMP who know their jobs and perform consistently.
- They want the HMP system to be more user friendly.
- They want other base personnel to have a better understanding and appreciation for the HMP system. (These are the people whose material orders the UECs and IPMs must process.)
- They think the initial training is good but want more update and computer (DHMMS) training.
- They want more control and to be involved with decisions.
- They think the HMP does a good job of reducing HazMat used on base.
- They appreciate programs that help them get material faster, deal with HazWaste, help with compliance issues, and increase worker safety.

#### **Observed Current System Characteristics**

- The database and data management system has problems.
- There is currently no career field for IPMs and UECs.
- People are assigned to the HMP for a temporary amount of time.
- New people change HazCodes on materials, which causes different levels of control for the material.
- People ordering material from UECs and IPMs do not understand the program.
- Initial training is adequate but doesn't meet new needs for IPMs and UECs.
- The HMP helps make sure the base is in compliance.
- The HMP reduces the total amount of HazMat used on base.
- The HMP manager is viewed as proactive and responsive.
- The HMP program gives IPMs and UECs professional development and some intrinsic rewards.
- The HMP does a good job of increasing worker safety and hazard awareness.

## **Areas For Improvement**

The above lists of observed customer desires and current system characteristics indicate that some gaps exist between how customers would like the system to be and how the system currently operates. Several of these gaps are similar to the items that were identified by the interrelationship digraphs. The areas that appear to be gaps will each be discussed below, and possible solutions to remedy the disparities will be presented.

**Information/Data Management:** The current information system being used by the HMP, or the information in it, appears not to meet the needs of its key customers. The information management system currently being used by the base studied is called DHMMS. The items of concern that were observed from the respondents was that the database contains poor quality or false information. It appears that this has mainly been due to operator errors inputting the required information in to the environmental database. An example that the respondents cited was that sometimes they would call to check a material order and the receiver of the call would look up the order in the system and report back that the order had already arrived, they had no record of the order, or other similar remarks that were unknowingly erroneous. Additionally, the focus group members stated that multiple versions (with different information) of the same product's Material Safety Data Sheet (which is a compliance item for the UECs and IPMs) were contained in the system. HMP personnel also reported that the MSDSs in the database created problems, and cited different vendors as a cause for the multiple versions of the MSDSs. At the time of this study, the HMP at which this research was conducted had recently hired a system administrator to more effectively manage the data

being input in to the information system. Lastly, respondents reported that they would like more DHMMS training so that they would be able to operate more effectively within the current system.

Possible solutions to the problem of false tracking of material orders would be to make sure unique order numbers are assigned to each order or to create measures to ensure the current program operates as designed. Part of the order number could be a unique number assigned to each UEC and IPM. For instance, an order number might be 970712001. In this case the first two digits could represent the year 97, the third and fourth digit would be the UEC or IPM number 07, the fifth and six digit could be a material code 12, and the last three digits could represent that this is order 001 for requester #7. However, a good numbering system for material orders will not be enough to ensure no false tracking occurs. Each material order must be updated when its status changes, and possibly a field should be used to include remarks about the change, such as: "Requester canceled order" or "Material arrived on 07 Dec 97." Unique order numbers and timely updates on all material orders will help the HMP ensure that false tracking is minimized and quality information is provided to customers. Related to false tracking is the issue of redundant and conflicting MSDSs in the database. One approach to prevent the continuation of this problem would be to check the current system for inputting MSDSs used by the HMP. If no step exists to see if a MSDS is already in the system for the specified chemical when a new MSDS arrives, a step such as this should be created. This step should be refined to delete or "tag" old MSDSs as not current and "tag" the one with the best information as current. Lastly, if the HMP deems the information in DHMMS is important for UECs and IPMs to access, or if UECs and IPMs

must use the computer system to perform their duties, the HMP should develop additional training programs to aid these individuals in the use of the computer information system. Improvements to the information system, such as those described in this paragraph, should help the HMP to better manage the HazMat entering the base and increase customer satisfaction.

**Personnel Issues For UECs and IPMs:** The IPMs and UECs stated that they felt that the work required for them to perform their duties was extensive enough to be a full time job. They also felt that a career field should be created for Hazardous Material Management. Currently, IPMs and UECs are "taken out of hide" by base organizations to order hazardous materials and to manage the organizations environmental management programs. Most of the IPMs and UECs questioned were volunteers for the additional duties associated with their job.

The solution to answering the UECs and IPMs desires is a simple one: create full-time positions for a person to handle environmental specific issues for all base organizations that require such duties to be performed. The fact that positions do not exist in these type of organizations for environmental managers may be due to the fact that the Air Force pollution prevention and environmental management programs are relatively new. Whether or not full time positions and a career field created for hazardous material managers should be adopted by the Air Force is beyond the scope of this thesis. However, it appears that further study should be put into this area, especially if the current emphasis the Air Force has on environmental matters is going to maintained.

**Lack of Base-wide Understanding and Support of the HMP Program:**  
The focus group members felt that other people had little or no idea of how HazMat is

ordered on an Air Force base. Furthermore, they felt that the HMP was sometimes taking orders from unauthorized HazMat requestors who unknowingly bypass the IPMs and UECs. The UECs and IPMs also felt that there was a general lack of support on the part of senior leaders to advocate for the HMP program. They reported that they are told that the HMP program is "very important" but do not see support being given to the program by Air Force leaders.

A solution to this problem would be for Air Force leaders to give "visible" support to the HMP program. This could be accomplished in a number of ways. One way to increase base-wide support of the HMP would be for commanders to mention the importance of the HMP during commander's calls. Secondly, Air Force leaders could write editorials in base papers or the *Air Force Times*. Lastly, training programs could be developed to make base personnel aware of the HMP's goals, programs, and policies much in the same way that Air Force members receive training on quality, social actions, etc. There are many ways for Air Force leaders to show their support for the HMP, and the benefit of doing so should increase the satisfaction level and performance of the HMP.

**Update Training Inadequate:** The HMP customers felt very interested in doing their jobs well. However, they felt that the HMP had developed several new programs (which they liked) that they did not completely understand how to utilize. Some specific programs that were mentioned were the IMPAC card purchasing program and the "Excess" or HazMat sharing program.

A solution to this issue is for the HMP to give mandatory training to all UECs and IPMs before a new program is implemented. A program that checks customer awareness

of proper procedures should be created to make sure participants fully understand the new programs and policies and how to use them. Furthermore, instructions could be written, that when UECs and IPMs need to respond or take action on an issue they will be able to refer to the proper guidance.

Scheduled meetings between UECs, IPMs and the HMP manager should greatly reduce customers feelings of being "behind the power curve" on new issues. This scheduled meeting could also act as a forum for HMP customers to bring up any concerns and would help to address the point made by HMP customers that they want more control and to be involved in the decision making processes of the HMP. This step of eliciting feedback from HMP customers on a regular basis may greatly help to increase their sense of involvement and satisfaction of the HMP program.

**Continuity Problems Within the HMP:** HMP customers felt as if "they" were constantly training the personnel within the HMP due to the short lengths of stay for many HMP employees. Currently, the HMP function is assigned to the Logistic Group with Civil Engineering process ownership. However, by its nature the HMP requires the expertise of personnel from several other base organizations, such as Bioenvironmental, Environmental Management or Civil Engineering, Communications, Safety, and Contracting. The current standard practice is for personnel to either be temporarily assigned to the HMP or "matrixed" (split time between the HMP and their squadron) to the HMP. The high turnover rate within the HMP appears to cause a great deal of dissatisfaction for UECs and IPMs. The major area of concern for HMP customers seems to arise from the switching of the Bioenvironmental person. The Bioenvironmental representative's duties include: assigning a materials hazardous coding, ensuring



authorizations for HazMat training is current, maintaining individual chemical exposure levels for all HazMat handlers, and ensuring MSDSs are properly managed.

A solution to the continuity problem within the HMP would be to require longer stays (over two years, compared to the one year or less currently experienced) for the Bioenvironmental person assigned to the HMP. Another solution to this problem would be to create a civilian position within the HMP capable of performing the Bioenvironmental duties described above. The use of a civil service employee would eliminate the problem of a Air Force Bioenvironmental specialist working outside of his career field for an extended period of time. Furthermore, the HMP manager is often from the Environmental Management directorate or the Civil Engineering environmental flight. If the HMP manager and Bioenvironmental representative are constantly being replaced, it is not surprising that problems have been attributed to HMP continuity. Air Force leadership has recognized that a problem does exist in area of personnel continuity for the HMP and held a conference on manning in July 1996. At this point, the HMP personnel recommendations from that conference have yet to be implemented.

**Summary of Areas For Improvement:** The TQM tools and their results pinpointed HMP Management Issues and HMP Policy as the key contributors to negative perception. However, it is the opinion of the researcher, after observing the two focus groups, that the respondents created these categories to encompass their general feelings about the HMP and that these categories do not well reflect the essence of what the respondents were expressing. The areas of improvement highlighted in this section can be thought of as the drivers of negative perception that would cause HMP customers to say that the HMP needs better policy or that there are concerns over management issues.

If the five areas highlighted in the above section (Information, Personnel, Training, Support, and Continuity Issues) are closely examined, it can be seen that they are related to the categories of Policy and Management. However, it is the opinion of the researcher that broad sweeping tactics to address Management Issues and Policy will not have as great of an affect on customer satisfaction of HMP as designing programs and policies to specifically address the five areas discussed in this section, because broad or general programs may or may not directly affect the deficient areas of the HMP program.

### **Costs of Control**

A goal of the HMP is to be the single point of accountability and control of HazMat on an Air Force base. The HMP is a control mechanism, and as such it takes away from individuals some freedom over the process it controls. Therefore, it is not surprising that four causes of negative perception were attributed by the two focus groups to the HMP's control over the process of requisitioning HazMat. The four responses were:

- 1, 2. "Too much material being regulated." (once from each group)
3. "Problems justifying quantities of HazMat ordered to the HMP"
4. "Too tight of control by the HMP"

One has too ask, "Does this mean the pharmacy is doing its job, or is it doing its job too well? Materials being regulated that were questioned by HMP customers were such items as batteries and cleaning products. The key issue of concern is that the system for regulating materials should be designed to effectively control HazMat while at the same time not creating undue or unnecessary hardships for HazMat requesters, adversely affecting their ability to perform their mission. Failure on the part of the HMP to achieve the correct degree of control will cause excess costs for the Air Force. These costs such

as fines, lack of congressional trust, loss of public support, and excess HazWaste if the HMP manages HazMat too loosely. If the HMP holds too tight of control over the release of HazMat, costs such as decreased productivity and decreased mission effectiveness will occur if people who need HazMat cannot get timely access to the supplies they need. Additionally, if HazMat controls are too tight, the possibility exists that requesters will bypass the pharmacy and acquire the materials covertly. Thus, the possibility of fines and loss of trust associated with too loose of a control system could occur. The specifics of how the HMP control structure should be organized is beyond the scope of this thesis, but the point was made to show decision makers that more than one side often exists to an issue and that before making implementation decisions from the results of this study the total system view of the HMP program should be considered.

Control was not the only issue causing negative perception among HMP customers. Other areas can be improved to raise the customer perception level of the HMP. As stated above, the greater the level of negative perception and frustration on the part of HMP customers, the greater the likelihood that base HazMat requesters will find another way to get the materials they need, especially if there is an "urgent" need compelling them to do so. This type of occurrence can be minimized by creating a HazMat management system that recognizes the needs of the HMP customer. This study identifies several areas that were reported as lacking by HMP customers. If these areas causing negative perception (outside of the control area) can be eliminated, customer perceptions of the HMP and its effectiveness will be heightened at no cost to its main goal of tracking and controlling HazMat. The HMP could then better achieve its other goal of achieving the highest degree of customer support possible.

### **Additional Benefits of Increased Customer Perception**

Air Force literature lists several benefits of the HMP other than tracking and controlling HazMat. These benefits have been reported as less HazMat ordered (purchasing costs), less HazWaste (disposal costs), less storage (inventory costs), reduced chance of HazMat spills and worker exposure (liability costs). The impact of these reduced costs can be significant to a base and the Air Force. Every dollar saved is the same as extra money that will be available to spend on other needs. The creation of sound policies and programs such as those advocated by the respondents in this study will raise the satisfaction level of HMP customers and should lead to increased use of and participation in HMP programs. One such program currently in existence at some Air Force bases is the "freebies" or excess program. The concept behind this program is that if an organization has excess material (as often occurs due to requirement changes or overages after a job completion), the organization can call the HMP and place the material on a freebies list. Once materials are put on this list, any organization wishing to order the same type of material can acquire the material free of charge. This practice both reduces HazMat purchasing costs for the "gaining organization" because no new material is ordered, and avoids a HazWaste disposal cost for the "losing organization." This is a Win/Win situation for the Air Force, but will organizations use this program if every time they have dealings with the HMP they do not want to go back? The point to be made is that the Air Force has stated that the HMP saves money, and an opportunity exists to save more money by raising participation levels of the HMP through increased HMP perception levels.

## **Recommendations**

Three ways exist for managers to improve customer perceptions of the HMP program. The three options that will raise the net perception level are: removing or reducing negative perceptions, adding or enhancing positive perceptions, or a combination of the first two methods. It is reasonable to assume that programs implemented to remove negative perception will also increase the levels of positive perception. For instance, if the negative perception factor "Lack of good research for HazMat substitutes" were removed by providing a better system to recommend less hazardous materials, it is possible that respondents would subsequently list "HMP provides good substitutes for HazMat" as a source of positive perception. Improving areas that were reported as already providing positive perception would likely have far less effect on the net perception level.

One reasonable approach to address the perception of the HMP would be to increase senior level support for the HMP (or make it more visible to UECs, IPMs, and HMP personnel) and to create more comprehensive management plans and policies for the HMP. The approach of improving the support and policy of the HMP and implementing other solutions discussed in the areas for improvement section of this chapter would address the key factors causing negative perception of the HMP.

Specifically, development of a management plan or operating instruction should consider creating permanent jobs within the HMP for employees with the current responsibilities of Bio, Supply, EM, and programming (data entry), with the objective of minimizing the continuity problems that currently exist. Permanent employees in the HMP would have more ownership over the program than those who are rotated through

the HMP on a yearly basis. Improved continuity and accountability created within the HMP should improve customers' perceptions and the overall effectiveness of the pharmacy. It is the opinion of this researcher, after conducting this study, that creating permanent employee positions within the HMP will ultimately have a greater impact on raising customer perceptions of the HMP than will addressing any other single issue identified by this research.

## **Chapter V**

### **Conclusions and Recommendations**

#### **Overview**

This chapter presents the conclusions and recommendations of this study. First, Chapters 1 through 3 and the findings in Chapter 4 are summarized. Second the conclusions drawn from these findings are presented. Lastly, some recommendations for follow-on research are discussed.

#### **Summary of Previous Chapters**

The purpose of this research was to identify the key causes of positive and negative perception of the HMP among its customers and their relationships. Chapter 1 presented a brief overview of the HMP and its objectives, the current status of the HMP, and brought to light the need for additional research on the HMP. Chapter 2 was a review of the federal legislation that has driven the need for a better hazardous materials supply system, and the Air Force policies and directives that govern the HMP. Also contained in Chapter 2 was a discussion of focus groups and their applicability to this research. The methodology chapter of this research, Chapter 3, stated the general methods used in this study and presented the TQM tools that would be used to answer the research objective.

Chapter 4 presented the results from each of the two focus group discussions and the TQM tools used to analyze the data on HMP customer perceptions. The key factors, identified by each focus group as having the most influence over other HMP issues, are reproduced below for both negative and positive perceptions.

Table 5.1 lists the key category, and its contents, identified by each of the two focus groups as influencing the most other categories of factors leading to negative perceptions. Factors within each category are shown from the greatest span of influence to least span of influence, as reported by the interrelationship digraphs.

**Table 5.1 Key Factors of Negative Perception**

<b>1<sup>st</sup> Group</b>	<b>2<sup>nd</sup> Group</b>
<b>MANAGEMENT</b>	<b>POLICY</b>
Lack of top level support	No Clear Policy
Lack of management plan	Lack of Senior Level Support
Need more training	Lack of Base-wide support
Too much being regulated	Problem interpreting HazCodes
Too tight control	Contractors don't track mat'l
	HMC should have MSDS's prior to ordering materials
	Not enough control at HazMat at issue point
	Civilian and Military authorization differences
	Problems implementing new policy

**Table 5.2 Key Factors of Positive Perception**

<b>1<sup>st</sup> Group</b>	<b>1<sup>st</sup> Group</b>	<b>2<sup>nd</sup> Group</b>
<b>Good HMP Programs</b>	<b>Better Knowledge</b>	<b>Helps with Material Usage</b>
Successful programs	Better Knowledge	Helps you get the right quantity
Good HazWaste pickup	People more aware of hazards	Reduced use of HazMat
Good excess database	Knowledge transfers work to home	Helps get rid of excess HazMat
Amnesty period		Good sharing program
Impact card		Reduced stockpiling - shelf life
ECAMP		
Saves \$		



## **Conclusions**

It is clear to see that HMP customers have both positive and negative perceptions of the HMP. The respondents were able to quickly generate between 15 to 30 factors of perception in approximately 25 minute brainstorm sessions. Interrelationship Digraphs were used to analyze the data gathered during brainstorm sessions and grouped by affinity diagrams to show relationships among factors. The results of the macro IDs and micro IDs help to identify the key factors that generate perceptions of the HMP. The information identified by this research should help decision makers create a better perception of the HMP among its customers.

If the current reports on the cost savings (e.g. Hill AFB HazMat orders went from \$11 million in 1991 to \$3.6 million in 1992 after a HMP had been implemented, Pro-Act 1994) introduced through the pharmacy are accurate, it is essential to make sure that the program succeeds and is optimized to provide the highest level of results possible.

## **Recommendations for Further Research**

The objective of this research was to identify and determine the relationships that exist among factors leading to positive or negative perceptions of the HMP. The next step in this process could be to determine the strength of each of the factors leading to perception. Since factors leading to perception have already been generated, a survey with this information could be sent to other HMP customers who would be allowed to score the level of positive or negative perception that the particular factor causes them.

Additionally, this research could be repeated at different bases or MAJCOMs. The findings of such a study could be compared to see if any trends exist. For instance, if one

base or command did particularly well in one area, an investigation into the programs and policies in place related to that area could be accomplished. After such an investigation, any significant findings explaining why the perception level was high could be benchmarked and cross-fed to other bases or commands.

Lastly, in order to measure the gains of addressing the issues brought forth in this research, a quantitative study could be accomplished on the effectiveness of the HMP. One method to accomplish this task would be to identify several base organizations whose size and mission were projected to be steady over the course of the next several years. Once the organizations identified for inclusion in the study had been identified, a baseline level of perception of the HMP could be established from those units. Additionally, it would be important to note the current performance levels (HazMat usage, fines, cycle-time, etc.) of the HMP program related to the included organizations. After the baseline data had been established, programs and policies addressing the areas identified as creating positive or negative perception could be implemented. After one year of emphasis on the new programs and policies, the new level of positive and negative perception of the HMP could be measured. Furthermore, the performance level of the HMP over the time frame of new policies and programs could be evaluated with the same measures that were used to identify the baseline performance level. Finally, a comparison of the HMP performance and perception levels could then be assessed compared to their baseline data. Decision makers would then be able to see which programs and policies are beneficial to continue at the HMP.

## Appendix A: Focus Group Members

### Name

Mary Bortz

George P. Broaddus

Mike Bushaw

Robert Delair

Belinda Johnson

Jackie Knueve

Michael Lane

Gordon Motley

Steve Nystrom

Charles O'Harrow

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